APPLICABILITY OF THE NORMALIZED DIFFERENCE VEGETATION INDEX IN INDEX-BASED CROP INSURANCE DESIGN

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ABSTRACT

Index-insurance is becoming increasingly popular because of its ability to provide low-cost, relatively easy to implement agricultural insurance for vegetation types whose productivity has been notoriously difficult to measure and to farmers in less-developed nations where traditional crop insurance schemes are not reasonable to implement. This study examines if the remotely sensed Normalized Difference Vegetation Index (NDVI) can be an effective basis for index-based crop insurance over a diverse set of locations. To do this I compare AVHRR-NDVI values to cumulative precipitation, extreme heat, and crop yields for sixty locations across the United States for the years 1982-2003. I use simple OLS quadratic equations to explore these relationships. My findings suggest that the relationship between NDVI, precipitation, extreme heat, and crop yields is highly variable and dependent on location-specific characteristics. Without site-specific calibration, NDVI should not be widely applied to index-based insurance product design. However, NDVI may still be a useful tool in insurance design under certain circumstances. Further research is needed to better characterize the factors affecting NDVI values and their relationships to crop yield.

BIOGRAPHICAL SKETCH

Megan McLaurin was born in coastal Wilmington, North Carolina to parents who were both university professors and to two loving sisters. From the beginning she had a great love of the outdoors, the arts, and the pursuit of academic knowledge.

Megan was eager to embark on her college education and began attending Barnard College in August 2003. While at Barnard she majored in Environmental Policy and minored in Women's Studies, graduating with a Bachelor's of Arts in May of 2007. Following graduation, Megan continued into a research assistantship position at Columbia University's International Institute for Climate and Society, where she worked for two years. During this time she nourished her passion for environmental and agricultural systems, becoming particularly fascinated by the development of economic tools allowing for their successful management.

Megan began her M.S. program in the field of Applied Economics and Management at Cornell University in August 2009. At Cornell, she has sought to deepen her knowledge of economic and financial structures as they relate to environmental and agricultural management. Upon completion of her Master of Science degree, Megan intends to pursue an education in environmental law, while retaining a focus on those issues most pertinent to agriculture.

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CHAPTER 1

Introduction

Index-based agricultural insurance is gaining increasing popularity due to its ease of implementation, its safeguards against the moral hazard and adverse selection problems frequently found in traditional agricultural indemnity insurance, and its resulting affordability (Hellmuth *et al.* 2009, Chantarat 2009, Barnett 2005). In the developing world, index-based insurance is seen as a method of providing risk protection to communities previously thought to be uninsurable (Skees 2008, Barrett *et al.* 2007). In developed countries, it provides an inexpensive method of hedging against weather risk in pasture, rangeland, and large monocultures (USDA 2009, Rowley *et al.* 2007,).

To date, most index-based insurance products are dependent on meteorological data collected via weather stations. This makes these products dependent on a strong meteorological information infrastructure, which often is non-existent in many of the developing countries that are the target clientele for this innovation in agricultural insurance. Increasingly, satellite information, in particular the Normalized Difference Vegetation Index (NDVI) is being promoted as a method of overcoming these weather information deficiencies (Ceccato *et al.* 2009, Hazell *et al.* 2010). As a result, programs employing NDVI data in index-based agricultural insurance currently exist in Canada, the United States, Spain, Kenya, and India (Diaz-Caneja *et al.* 2009).

NDVI is a satellite product that measures the vigor and greenness of vegetation on the earth's surface (Tucker 1985). The idea behind using NDVI in index-based insurance is that by measuring greenness, NDVI provides a description of vegetative health at any given time, and in turn, should be closely correlated with crop yields and primary production. NDVI values are thought to reflect the many variables affecting crop growth and distress, leading to a more comprehensive expression of crop health than an index based on one or two weather variables alone (Atwood *et al.* 2005, Makaudze and Miranda 2009, Hazell *et al*. 2010) Furthermore, NDVI data is available in an uninterrupted dataset of 21 years for the entire globe.

Most of the literature on NDVI is centered in the remote sensing community, and research on its ability to serve as a proxy for yield data or as a measure of primary productivity has arrived at mixed conclusions (du Plessis 1999, Makaudze and Miranda 2009). However, for insurance purposes, it is not necessary for NDVI to have strong enough correlations with yield and primary productivity to reflect slight fluctuations in crop growth. Insurance fundamentally deals with anomalous losses. Some year-to-year variation in crop yield is simply part of the business of agriculture; crop insurance is in place to protect the farmer against the event of extreme crop loss. Index-based insurance, in particular, functions as a hedging product intended to protect a policy owner from environmental shocks (Syroka 2006). Thus, the ability of NDVI to capture years of extreme crop loss is of the greatest interest. Yet, there has been little research linking NDVI to crop indemnities, particularly in the economics literature.

This study contributes to the literature exploring the relationship between NDVI, meteorological variables and crop productivity by examining the relationship between NDVI and indemnity events. Specifically, it seeks to determine if NDVI can be applied generally as a substitute for meteorological and yield data in the development of index-based agricultural insurance products. For NDVI to be an adequate base for generalized index-based agricultural insurance products, it needs to be a reliable indicator of acute crop loss across a variety of locations representing an assortment of growing practices and diverse climate regimes. With its abundance of meteorological data and its diverse geography and farming practices, the United States provides an ideal setting for exploring this question. I use meteorological data from 59 weather stations across the United States to explore the relationship between NDVI and weather variables. I then use a subsample of 25 locations to compare NDVI with yield data directly. My findings suggest that NDVI cannot be applied generally as a reliable indicator of crop loss, though it may work under specific conditions and in select locations, or when used in conjunction with *in situ* data.

The overall objective of this paper is to investigate the potential of NDVI for use in index-based crop insurance products. Specific objectives include investigating the relationship between NDVI, precipitation and extreme heat for locations across the United Sates, and assessing the relationship between NDVI and crop yields for a wide variety of locations possessing diverse characteristics. To do this I first use a simple robust OLS quadratic function to regress NDVI on precipitation and extreme heat measures. I then apply a robust OLS quadratic equation to estimate the relationship between yields and NDVI. To look at the relationship between NDVI and crop indemnity more directly, I also examine the applicability of an NDVI-based insurance contract across several locations for the soy and corn crop.

The remainder of this thesis first describes the literature on NDVI as it relates to meteorological variables and predictions of crop yields and some of the NDVI-based insurance products currently on the market. Then I present the data and methodology used for this study, followed by the results of my analysis. I end with a discussion of the results and the insights they provide into applications of NDVI in index-based insurance products.

CHAPTER 2

NDVI as a Measure of Crop Indemnity, Prior Studies and Current Projects

Relationships between NDVI and meteorological variables

Several studies exploring the relationship between NDVI and climate variables carried out in the United States' Great Plains found varying results on the influence of these variables on NDVI (Di *et al.* 1994, Tieszen *et al.* 1997, Wang *et al.* 2001 and 2003, Tan 2007, Yang *et al.* 1998). In a study using precipitation data from 410 weather stations and temperature data constructed from 17 weather stations across the state of Kansas, Wang *et al.* found precipitation to be the dominant climate regime influencing both temporal (2001) and spatial (2003) NDVI variation. However, other research suggests that temperature has greater influence on NDVI variation in much of the Great Plains (Tan 2007, Yang *et al.* 1998, Zhou *et al.* 2001).

Differences in studies likely result from the size of the study area and climate regimes covered, as the climate variable most affecting NDVI appears to vary depending on vegetation type and frequency of rainfall events. Yang *et al.* (1998) collected climate data from 72 automated weather stations across the northern and central Great Plains, and found summer and spring precipitation to be the dominant climate control on grassland NDVI in the southwest region of the study site, while NDVI was strongly influenced by temperature and precipitation in the northern region of the study site. This was accredited to the predominance of plants with C3 photosynthetic pathways in the north and those with C4 photosynthetic pathways in the south.

Growing degree days and soil temperature were also found to be closely correlated with NDVI in Nebraska (Yang *et al.* 1998).

In comparing data for grassland, cropland, and forest, NDVI has the strongest correlation with precipitation in the grassland vegetation regime. NDVI correlation is also stronger in instances where there are distinct precipitation events, meaning a wet year following a dry season or a series of dry seasons. Precipitation data from the preceding growing season also seems to play an important role in the NDVI for the current growing season (Wang *et al.* 2001).

In Africa, meaningful direct relationships have been found between NDVI, rainfall and vegetation cover in many studies carried out in the Sahel Zone (Tucker *et al.* 1985; Hielkema *et al.*, 1986, Malo and Nicholson 1990), Botswana (Prince and Tucker 1986), East Africa (Boutton and Tieszen 1983, Davenport and Nicholson 1993) and Tunisia (Kennedy 1989). However, findings for these locations were still highly variable. Nonetheless, it is often concluded from this body of work that NDVI and precipitation have a strong linear (Malo and Nicholson 1990) or log-linear (Davenport and Nicholoson 1993) relationship, when monthly and annual precipitation is within a range that makes rainfall a limiting factor on vegetation growth. This last condition, confines the strongest relationships between NDVI and precipitation to regions where annual rainfall is within a specific range, identified as between 300 and 900 mm in South Africa (Richard and Poccard 1998), between 500 and 700mm in China (Li *et al.* 2002), and less than 700 mm with an average rainfall/PET ratio of 0.5 to 2 in Spain (Udelhoven *et al.* 2009).

Despite these conclusions, the highly variable relationships between rainfall, temperature and NDVI exhibited in these collective studies warrant caution in relying on NDVI in applied work. Differences in soil and vegetation type, time of year, and span of time contribute to some of this variation. Farrar *et al*. (1994) found NDVI to only reflect changes in precipitation for specific soil types. Furthermore, some variability is likely the result of complex radiative interactions between the atmosphere, sensor view angle, and solar zenith angle, which all effect NDVI value accuracy and are difficult to account for in standard adjustments (du Plessis 1999). Numerous scientists in the remote sensing community have warned of NDVI's limitations (Ceccato *et al.* 2009, Lillesand and Kiefer 1994). However, these limitations are rarely considered in most NDVI research and NDVI data applications.

Regions where the precipitation regime is not of a range that characterizes it as a limiting factor to plant growth, soil moisture appears to become the dominant climate variable affecting NDVI values. Farrar *et al.* (1994) found soil moisture of the concurrent month to have a strong effect on NDVI values in Botswana, once rainfall was below a threshold of 500 mm. In a study of NDVI and rainfall anomalies in Spain, Udelhoven *et al.* (2009) found water deficit, not rainfall amount, to be the predominant factor determining NDVI anomalies. As a result of this, NDVI was poorly correlated with rainfall in arid and humid regions, where soil water content is quickly depleted after a rainfall due to evapotranspiration in the former, and frequent rainfall and low evapotranspiration rates create a buffer of soil moisture in the latter. This corresponds to Yang et al.'s (1998) finding that NDVI and evapotranspiration are negatively correlated.

Collectively, the work on relationships between NDVI, precipitation and temperature is characterized by highly variable relationships. This implicates the strong influence of other factors, such as soil and vegetation type, geographic region, climate zone, and radiometric disturbances of NDVI measurement in the ability of NDVI to reflect changes in precipitation and temperature.

Relationships between NDVI and agricultural productivity

Much like the relationship between NDVI and meteorological variables, the relationship between NDVI and agricultural productivity appears to be highly variable depending on a wide variety of additional site-specific characteristics. Box *et al.* (1989) found the relationship between NDVI and primary productivity to be consistent across the globe, with NDVI possessing a predictive accuracy comparable to climate-based models of annual net primary productivity. However, their study also found NDVI values to be unreliable in areas of complex terrain, such as those characterized by coastlines, high mountains, or dry regions using irrigation.

The relationship between NDVI and forage production has also been established in a number of studies, both in the U.S. and abroad (Paruelo and Lauenroth 1995, Fuller 1998). In their study of grasslands throughout Montana, Thoma *et al*. (2002) found NDVI to explain 63% of the statistical variation in live biomass. This relationship was consistent for all of six of their sample locations, which spanned north and south Montana. Similarly, Kennedy (1989) found strong correlations (r= 0.85 and r= 0.90) between NDVI aboveground green biomass in grazing lands in Tunisia. In what is perhaps a more comprehensive study, du Plessis *et al.* (1999) found NDVI to predict green aboveground biomass in Etosha National Park, Namibia with a coefficient of determination of 0.5166, a statistical relationship they describe as “poor,” while many papers stating similar values describe the relationship as “meaningful” or “strong.”

Establishing a relationship between crop vigor during the growing season (NDVI) and final crop production for field crops is not as simple, as final crop yields depends on a range of factors including nutrients, solar radiation, and water stress during critical stages of plant growth which may not be reflected in NDVI values (Ceccato *et al.* 2009). Furthermore, NDVI appears to perform most accurately over large areas of grassland (Yang *et al.* 1998, du Plessis *et al*. 1999, Thoma *et al*. 2002), which differ from the multi-layered nature of vegetation present in cropland. Farmland also often contains a multitude of vegetation types, including several crops, often rotated, each with different planting and harvesting times. These factors all add to the complexity involved in measuring crop health using satellite data.

In Swaziland, Mkhabela *et al.* (2004) discovered that NDVI could be used effectively to forecast maize yield in three of the country’s four agro-ecological regions. Lewis *et al.* (1998) found NDVI to be a good indicator of maize production in a study using annual maize production statistics for 36 agricultural districts in Kenya. Nonetheless, just as variability characterizes the relationships between NDVI, temperature and rainfall, it is a defining characteristic in the relationships reported between NDVI, vegetation, and crop yield in the literature. This points to a need to clarify the limitations of NDVI in order to best understand the potential for future applications.

Investigating applicability of NDVI in index-based insurance

A very few studies exist directly exploring NDVI’s potential for use in insurance products. Majority of those few focus on NDVI for use in rangeland

and pasture insurance, due to the particular difficultly in measuring rangeland and pasture productivity, since it does not possess the equivalent of yield data, the common measurement of loss used in crop insurance. In the United States, Rowley *et al.* (2007) compared rancher perception of low production years to NDVI data for several counties in Kansas and Oklahoma. Their study found weak statistical relationships between individual range productivity and NDVI values (R^2=0.15). However, when this data was aggregated to the county level, the relationship between NDVI values and rancher perception of productivity improved substantially (R^2= 0.65). This discrepancy between ranch and county results illustrates the fundamental issue of basis risk that is continuously acknowledged as one of the main limitations of index-based insurance products (Barnett 2004).

Rowley *et al.* (2007) also found NDVI failed to capture mid-season low rainfall events flanked by periods of high rainfall. While ranchers classified such years as years of poor range productivity due the critical timing of the low-rainfall event, NDVI was unable to mark this effect on range conditions. Atwood *et al.* (2005) suggest a dual trigger mechanism on insurance products to overcome some of these problems. Their investigation into using NDVI suggests that it is a highly competent tool for rangeland insurance purposes, as long as crop rotation and technology trending are not factors within the rangeland and the annual range production is not dependent on end of season conditions.

Also working in rangeland conditions, Chantarat (2009) used NDVI data to design an index-based livestock insurance contract for pastoralists in Northern Kenya. With this data, she was able to establish a predictive relationship for livestock mortality, using vegetative conditions derived from NDVI values.

Makaudze and Miranda (2009) assessed the possibility of using NDVI for crop insurance for corn and cotton crops in Zimbabwe. While the authors conclude that NDVI holds great potential for index-based insurance, their results suggest the relationship between NDVI and crop yields to be highly variable between crops and districts. They discover a correlation between NDVI during critical growth stages of the crops and yields ranging from 0.42 to 0.70, depending on crop and district. The timing of this critical growth stage also varies depending on district location, thus requiring calibration based on farmer input on a district-by-district basis.

Existing index-based agricultural insurance projects using NDVI data

NDVI-based insurance programs currently exist in the USA, Canada, India, Kenya, Ethiopia and Spain. The USDA's Risk Management Agency (RMA) runs a pilot vegetation index insurance program for pasture, rangeland and forage. The program has been available since 2007 in select states, and was expanded in 2009 to include additional states. States were chosen such that the index would be tested in various climate, soil and weather conditions via six US regions: the warm and humid Southeast, the cool and humid Northeast, the Northern Great Plains, the Southern Great Plains, the semi-arid Southwest, and the intermountain region of the Northwest. Farmers select one or more 3-month time periods that represent the high-risk time period for their pasture, rangeland, and forage management practices. NDVI data used to evaluate loss is in the form of a 4.8x4.8 mile grid, and losses are evaluated according to the grid, not losses experienced at individual properties. Losses are calculated as the difference between the expected normal NDVI value and the actual NDVI value experienced for the interval the farmer chose to insure. A payment is received when this number falls below a certain trigger grid index (USDA 2009).

NDVI-based insurance in Canada was launched in 2001 by Agriculture Financial Services Corporation (AFSC). The insurance is limited to area where pasture is the predominant landcover and is intended to cover hay production. NDVI data is calculated for each township in the area and is scaled to reflect native pasture production. Areas of irrigated cropland and bush are removed, as they can significantly influence the program outcome. A pasture vegetation index (PVI) is developed for each square kilometer of the township. Pasture production data collected by AFSC during a past cage clipping system operation was used for correlation comparisons from 1991-1999. Precipitation data measured at Environment Canada weather stations was also compared to NDVI data, and client meetings were conducted where farmers identified their two best and two worst pasture production years in the last fifteen year period. Historical PVI values seemed to identify production shortfalls resulting from cool early season temperatures and drought. In addition, the anecdotal production perception of farmers surveyed corresponded to geographical differences between township PVI values. NDVI correlations with precipitation data and collected production data were not considered good, with an $r = 0.65$.

AFSC augmented NDVI data by collecting precipitation and pasture growth data over the growing season at test stations throughout the insured pasture area. This substantially improved correlations between the developed PVI index, precipitation and pasture production (Diaz-Caneja *et al.* 2008).

Thus, the developed insurance index takes into account production data alongside NDVI data. A loss payment is triggered when the current year's PVI falls below 90-85 percent of the average PVI from previous years (the percentage depends on if the farmer has full-season or split-season coverage) (AFSC 2009).

Spain's NDVI-based insurance was designed to protect farmers from droughts affecting pasture areas. It has also been available since 2001, but unlike Canada's insurance scheme, Spain's insurance index is solely based on NDVI data; it is not verified by any additional measurement of yields. The index is constructed using historical NDVI values for the given area to create a curve of expected NDVI values. When actual NDVI observations in a given year fall below the average curve an indemnity is defined. NDVI values are defined for a ten-day period. The maximum value for each ten-day period is used to reduce the effect of clouds; this is called the Maximum Value Composite Index (MVCI). The deductible is the historic average MVCI for each area minus 1.25 standard deviations from the average MVCI (Diaz-Caneja *et al.* 2008).

The Agricultural Insurance Company of India (AIC) uses NDVI data combined with temperature parameters for their wheat insurance index. NDVI and temperature data from the peak crop growth stage is used to determine if there is to be a payout (AIC 2009). AIC is also in the process of carrying out research intended to aid in developing an NDVI-based index insurance product for tea production.

A pilot index insurance project for several Millenium Villages locations uses NDVI as its basis. The project used NDVI data with an 8km resolution, aggregating data to an average area of 100km x 100km. The index targeted the time between flowering and harvest in local cropping calendars, since this was found to have the strongest relationship between local rainfall and historical yields. NDVI was found to be sufficient to underpin contracts in regions of Senegal, Mali, Ethiopia, northern Nigeria and northeastern Kenya because of their semi-arid climates. NDVI was used in combination with rainfall for the wetter, less variable climates of Uganda, Rwanda, Tanzania, Malawi, and western Kenya. Research for these projects found that when native vegetation shows signs of stress at the 100 km x 100 km scale, crop yields are typically greatly reduced (Hellmuth, M.E. *et al.* 2009).

The combination of a growing number of projects implementing NDVI-based index insurance products and the highly ambiguous results presented in the literature regarding the relationship between NDVI, meteorological variables, agricultural productivity, and crop yields presents a great need for better understanding of the reliability of NDVI in assessing crop indemnities. Current research suggests the ability of NDVI to reflect variations in rainfall and agricultural productivity is highly dependent on location of the study and timing of the research.

CHAPTER 3

Data and Methodology

The Normalized Vegetation Index (NDVI)

The Normalized Difference Vegetation Index (NDVI) is a satellite product that measures the vigor and greenness of vegetation on the earth's surface. It is calculated as the ratio of visible spectral wavebands to near-infrared spectral wavebands. Healthy, green vegetation has a high presence of chlorophyll pigment, which causes low reflectance in visible wavebands and high reflectance in near-infrared wavebands. The reverse is true in vegetation under stress.

NDVI is a unit-less index, with values ranging from -1 to 1. Healthy vegetation has the highest positive values, while bare soil, water, snow, ice, or clouds have NDVI values of zero or that are slightly negative. Vegetation under stress or with a small leaf area has lower positive NDVI values. Typically the NDVI values from healthy vegetation will increase as plant cover increases at the beginning of the growing season, reach a peak sometime during the middle of the growing season, and will then decrease as the season comes to its end (Mkhabela *et al.* 2005).

For this study, I will use the AVHRR-NDVI dataset provided by the University of Maryland. The AVHRR-NDVI dataset is desirable because it is a global gridded dataset, with an 8kmx8km spatial resolution. Additionally, the AVHRR-NDVI dataset has been recommended for use in index-based insurance products above alternative satellite options (Atwood *et al.* 2005). The dataset begins in 1981 and goes through 2003, with bimonthly NDVI estimates. The NDVI value for each bimonthly period represents the maximum NDVI for that period. This is the most effective method of reducing errors resulting from cloud cover and similar distortions. I use NDVI data for the grid point associated with each of the 60 meteorological stations. Data was collected for an estimated growing season, beginning May 1 and ending August 15 and containing seven bimonthly periods.

Meteorological and Crop Yield Data

Meteorological data was obtained from NOAA, via the internet-based weather risk evaluation tool WeatherWizard (Norton and Turvey 2007). I collected cumulative precipitation, average mean daily temperature, and cumulative growing degree days for each bimonthly period corresponding to the NDVI data. Growing degree days were calculated using an 80 degrees Fahrenheit standard in order to capture extreme heat.

County-level crop yield data was selected for a sub-sample of 29 stations for 1982-2003. This included yearly yield data for hay, corn, soybeans and wheat depending on the crops grown in the selected counties. This data was obtained from the USDA's NASS.

Site Locations

All the sites selected are located in heavily farmed areas known to use little or no irrigation. Locations of meteorological stations are shown in Figure 3.1. Circles mark the 60 meteorological stations. Those stations where county level yield data was also collected have an X to their left.

Figure 3.1. Location of study sites. Circles represent location of meteorological stations. X's represent locations for which county level yield data was also collected.

The sites span variety of climate regions within the U.S. Five are located in coastal areas, and one on Lake Eerie. The locations also represent a range of elevations, from sea level to 1,485 m.

NDVI and Meteorological Variables

I first compared NDVI to cumulative precipitation and growing degree days using the quadratic equation below

(Equation 3.1)

$$NDVI_{yp} = \mu + \alpha_y + \gamma_p + \beta_1 cp_{yp} + \beta_2 gdd_{yp} + \beta_3 cp_{yp}^{\ 2} + \beta_4 gdd_{yp}^{\ 2} + \beta_5 cpgdd_{yp} + \varepsilon_{yp}$$

where *NDVI* is the bi-monthly values for NDVI at a given station, *cp* is cumulative precipitation for the same bi-monthly period, *gdd* is the cumulative growing degree days for the period, and α is the constant term. The quadratic function was used in order to capture interaction effects between the variables, as precipitation and heat, as well as the joint effect of the two, are important in identifying instances of severe crop distress and loss. Using the growing degree day standard of 80°F, allows the *gdd* variable to capture instances of extreme heat. Thus, this equation should not only be reflecting the vegetation stress caused by a lack of rainfall or extreme heat, but also the combined effect of rainfall and extreme heat events. I used this equation to carry out regressions for each of the 59 locations.

I selected this model after exploring both linear and log-linear models, since prior studies have suggested these to describe the relationship between NDVI and precipitation. However, these studies were describing relationships within a specific climate regime, and where grassland was the predominant groundcover. For the variety of locations we are assessing, the quadratic model presents a more comprehensive method of exploring the relationship between NDVI, cumulative precipitation, and growing degree days. Initial regressions included mean temperature in addition to these variables, but mean temperature was not a significant variable in any of the locations, nor did it appear to contribute additional information relating to temperature, as this study is most interested in cases of extreme heat, best captured using the growing degree measure.

NDVI and Crop Yields

Since the relationship of most importance in an index-based insurance product is between the data used in the index itself and crop yields, I selected a subsample of 25 stations to use in comparing crop yields and NDVI directly. Again, I used a quadratic equation in order to capture interaction effects between precipitation and heat, this time using crop yield as the dependent variable, and adding NDVI into the equation as an independent variable. The model used is presented below

(Equation 3.2)

$$yield = \alpha + \beta_1 NDVI + \beta_2 cp + \beta_3 gdd + \beta_4 NDVI^2 + \beta_5 cp^2 + \beta_6 gdd^2 + \beta_7 cpNDVI + \beta_8 gddNDVI + \beta_9 cpgdd$$

where *yield* is county-level yield data for years 1982-2003; *NDVI* is the maximum NDVI value during the growing season; *cp* is cumulative precipitation for the growing season; *gdd* is total growing degree days during the growing season (again measured using the 80°F standard), and α is the constant term. As previous studies have suggested both integrated NDVI and maximum NDVI as the best predictors of crop yield, I also performed a regression analysis using integrated NDVI for the growing season as the *NDVI* variable. Results for the two measures were not significantly different, and all results presented here are for maximum seasonal NDVI values.

The analysis was carried out for each of the 25 locations using county-level corn yields. I also fit the model using hay, wheat, and soybean yields for those stations in which these crops were relevant and the data was available. In the case of wheat, this was all stations except Algona, IA and Montrose, PA. For hay, this excluded stations located in Missouri. And for soybeans, this excluded Montrose, PA, Heppner, OR, Eltopia, WA, Ardmore, SD and stations located in New York.

CHAPTER 4

Results and Discussion

NDVI and Meteorological Variables

General Trends

Results of the regressions of NDVI on meteorological variables were mixed across stations, without apparent trends in which meteorological variables are significant in determining NDVI, or even common signs on coefficients for the same variables. Cumulative precipitation was a significant variable in determining NDVI for 7 of the 59 stations. Coefficients for *cp* were negative in 39 of the 59 stations. cp^2 had a negative coefficient in 22 of the locations, and was only significant for 8 of the 59 stations. Similarly, *gdd* was a significant factor in determining NDVI for 4 stations, and had negative coefficients in 27 of the locations. gdd^2 was only significant in 5 stations, and its coefficient was negative for 28 locations. The interaction term *cpgdd* was only significant for 6 stations, and had a negative coefficient in 22 locations.

The coefficient of determination for the model when applied to the 59 stations ranged from 0.2435 to 1.0, with 49 percent of stations having R^2 values greater than 0.6. Those stations with higher R^2 values did not show more consistency in coefficient signs across variables, and had mixed results in which variables were significant in determining NDVI. It is clear from this assessment that R^2 as a matter of course is not meaningful without also having consistency in parameters. However, across stations, the F-tests agree that the model has explanatory power. Appendix A includes complete results from the regression analysis. In the regression analysis of several stations, *GDD, GDD*^{2}, and in some cases, *CPGDD* was dropped from the model. These are instances where there were no days where average temperatures rose above 80°F.

Case Studies: Saluda, SC, Windsor, IL and Angelica, NY

Because of the large number of regressions performed in this study, 176 in total, only a few case studies are presented and discussed in detail here. Complete results are included in the appendices. I attempted to select case studies representative of the wide variety of results observed in this analysis.

Results for the regression of NDVI on meteorological variables at three of the locations are presented in Tables 4.1, 4.2, and 4.3. Of these three examples, Saluda had the lowest R^2 value and none of the meteorological variables are statistically significant in determining NDVI for this location. Nonetheless, the F-test for this regression implies the results do have legitimate explanatory power. The lack of statistical significance of the coefficients on meteorological variables is not necessarily alarming, as the true marginal effects of cumulative precipitation and extreme heat on NDVI are revealed by taking the partial derivatives of the regression with respect to *cp* and *gdd.*

Table 4.1. Results for regression of NDVI on meteorological variables for Saluda, SC

Variable	β	Std. err.	t	P-value	95% Confidence Int.	
CP	.0031002	.000611	0.51	0.613	-.0089987	.0151991
GDD	.0089049	.2681629	0.03	0.974	-.5219943	.5398042
CP^2	-.0008605	.0008164	-0.98	0.329	-.002598	.000877
GDD^2	-.0009544	.0007525	-0.01	0.991	-.1700828	.1681739
CPGDD	.0050411	.0066899	0.15	0.884	-.0633812	.0734636
R^2						0.3270

The weather response function for NDVI at Saluda, SC is shown in Equation 4.1.

(Equation 4.1)

$$NDVI = 0.73797 + 0.00310cp + 0.00890gdd - 0.00861cp^2 - 0.00095gdd^2 + 0.00504cpgdd$$

Solving for $\frac{\partial NDVI}{\partial cp} = 0$ and $\frac{\partial NDVI}{\partial gdd} = 0$ simultaneously results in *gdd**=-5.36405 and *cp**= -2.78197. While the negative optimum for *gdd* is expected, as it represents a sensitivity of NDVI to extreme heat, the negative optimum for *cp* does not appear reasonable, as we would expect higher levels of rainfall to lead to increased levels of vegetation greenness.

In the case of Windsor, IL (see Table 4.2), I also did not find a significant relationship between NDVI and each meteorological variable using this model. Signs on coefficients differed from those in Saluda, SC for every variable, with the exception of *cp.* However, the coefficient of determination for this station is stronger (R^2=0.8429), and the F-test also shows the model to possess significant explanatory power.

Table 4.2. Results for regression of NDVI on meteorological variables for Windsor, IL

Variable	β	Std. err.	t	P-value	95% Confidence Int.	
CP	.0011286	.015059	0.07	0.940	-.0286896	.030947
GDD	-.0001142	.0010117	-0.11	0.910	-.0021175	.0018891
CP^2	-.0004187	.0020536	-0.20	0.839	-.0044849	.0036476
GDD^2	3.55e-06	7.41e-06	0.48	0.633	-.0000111	.0000182
CPGDD	-.0000677	.000192	-0.35	0.725	-.0004479	.0003125
R^2						0.8429

The weather response function for Windsor,IL NDVI is given by

(Equation 4.2)

$$NDVI = 0.40276 + 0.00113cp - 0.00011gdd - 0.00042cp^2 + 3.55e - 06gdd^2 - 0.00007cpgdd$$

Again, by setting partial derivatives with respect to *cp* and *gdd* equal to zero, we can solve for the optimum values of *cp* and *gdd.* This results in *cp** = -0.00058 and *gdd**=16.67096. Still the optimum value of *cp* is negative, while for this location, the optimum value of *gdd* is positive. As the weather response function indicates a negative optimum value of cumulative precipitation to maximize NDVI, it appears that NDVI is not accurately reflecting the relationship between cumulative precipitation and vegetation condition.

In Angelica, NY, both cumulative precipitation and cp^2 are significant variables at the 20th percentile. Cumulative precipitation has a negative coefficient, which does not reflect the positive correlation between rainfall and crop growth, yet cp^2 also has a positive coefficient, which is different from what we saw in the case of Saluda, SC and Windsor, IL. Again, we see a reasonable R^2 value (0.6782), falling in between the stronger and weaker values found in Windsor, IL and Saluda, SC, respectively. Here the F-test also shows the results to have explanatory power. Results for this analysis are displayed in Table 4.3.

Table 4.3. Results for regression of NDVI on meteorological variables for Angelica, NY

Variable	β	Std. err.	t	P-value	95% Confidence Int.	
CP	-.0214638	.013715	-1.56	0.120	-.0486331	.0057054
GDD	-.0059557	.0149818	-0.40	0.692	-.0356344	.023723
CP^2	.0034728	.0021568	1.61	0.110	-.0007999	.0077455
GDD^2	.0002725	.0008616	0.32	0.752	-.0014344	.0019794
CPGDD	.0051141	.0042287	1.21	0.229	-.003263	.0134911
R^2						0.6782

Equation 4.3 depicts the weather response equation for Angelica, NY NDVI.

(Equation 4.3)

$$NDVI = 0.60129 - 0.02146cp - 0.00596gdd + 0.00347cp^2 + 0.00273gdd^2 + 0.00511cpgdd$$

By finding the particular derivatives with respect to *cp* and *gdd* and solving both simultaneously, setting each to 0, we find optimum values of cp*=-1.679 and gdd*=5.33743. Again, the negative optimum cumulative precipitation value illustrates that NDVI is not effectively capturing the affect of precipitation on vegetation growth and health.

These three locations represent the wide variety of relationships between NDVI, precipitation, and extreme heat across the many locations surveyed. Generally most instances where the model had a low coefficient of determination corresponded to locations in the southeast; however, this was not consistently the case and several of these instances were for stations located in other regions of the country. Differences in signs on coefficients for precipitation and extreme variables could not be explained simply by the station's regional location. Elevation and coastal location also did not account for inconsistencies between regression results across stations.

NDVI and Crop Yields

General Trends

Comparisons of crop yield data to NDVI values also produced ambiguous results. In estimating the quadratic model for corn yields, *NDVI* was a significant variable in three of the 25 locations. The estimated coefficients on *NDVI* were negative in 32% of locations. Coefficient of determination for the model ranged from 0.2043 to 0.862. For a given location, signs on coefficients and which variables were statistically significant were not consistent across multiple crops. The two case studies presented below illustrate the wide variation in relationships between Yields, NDVI and meteorological variables across sites and crops. Complete regression results for all stations and crops are provided in Appendix B.

Case Study: Saluda, SC

Results for Saluda, SC, show the model to be fitting well, with a relatively high coefficient of determination when using corn and soy yield data

(0.6606 and 0.7826, respectively). For both crops, F-tests show the model to hold some significance.

Table 4.4. Results for Yields regressed on NDVI and meteorological variables, for corn at Saluda, SC

Variable	β	Std. err.	t	P-value	95% Confidence Int.	
NDVI	-5162.91	13404.89	-0.39	0.706	-34122.41	23796.59
CP	1.414855	29.85728	0.05	0.963	-63.08787	65.91758
GDD	14.25214	11.96689	1.19	0.255	-11.60075	40.10502
$NDVI^2$	3094.49	8757.491	0.35	0.729	-15824.92	22013.9
CP^2	-.044294	.2597625	-0.17	0.867	-.6054768	.5168886
GDD^2	-.764791	.3428671	-2.23	0.044	-1.50551	-.0240713
CPNDVI	4.016267	41.93387	0.10	0.925	-86.57634	94.60888
GDDNDVI	Dropped					
CPGDD	-.189214	.9618443	-0.20	0.847	-2.267152	1.888724
R^2						0.6606

The only variable showing a significant relationship with corn yields in Saluda was GDD^2, which had the predicted negative coefficient. Soy yields, however, had a significant relationship with all but two of the variables (CP^2 and *CPGDD*). See Tables 4.4 and 4.5.

Table 4.5. Results for yields regressed on NDVI and meteorological variables, for soy at Saluda, SC.

Variable	β	Std. err.	t	P-value	95% Confidence Int.	
NDVI	-10648.65	2553.056	-4.17	0.001	-16211.28	-5086.022
CP	-31.69274	10.51508	-3.01	0.011	-54.60312	-8.782355
GDD	4.832407	1.600502	3.02	0.011	1.345213	8.319602
$NDVI^2$	6576.267	1568.007	4.19	0.001	3159.873	9992.661
CP^2	.0368131	.0526719	0.70	0.498	-.0779492	.1515754
GDD^2	-.1174383	.0449632	-2.61	0.023	-.2154047	-.019472
CPNDVI	40.50446	12.16288	3.33	0.006	14.00383	67.00509
GDDNDVI	Dropped					
CPGDD	-.1642622	.1284485	-1.28	0.225	-.4441275	.115603
R^2						0.7826

The regression of corn yields on NDVI and meteorological variables yields the following equation

(Equation 4.4)

$$Yield = 2150.967 - 5162.91NDVI + 1.414855cp + 14.25214gdd + 3094.49NDVI^2 - 0.044294cp^2$$
$$-0.764791gdd^2 + 4.016267cpNDVI - 0.189214cpgdd$$

To measure the marginal effect of *NDVI, cp*, and *gdd* on corn yields I took the partial derivatives of this equation with respect to each of these three variables. I then evaluated these equations using the mean value for each variable to estimate the marginal effect of each on corn yield. This resulted in the following results, $\frac{\partial Yield}{\partial NDVI} = -2739.48$ $\frac{\partial Yield}{\partial cp} = 3.59$ $\frac{\partial Yield}{\partial gdd} = 10.49$

where the marginal effects are the change in bushels of corn yielded for an increase in one unit of *NDVI*, *cp*, and *gdd* , respectively. The negative marginal effect of *NDVI* on corn yields shows that in the case of Saluda, SC, increased NDVI values do not reflect increased yields for the corn crop. While the marginal effect of *cp* on yields is positive, as would appear reasonable.

The yield function for soy yields in Saluda, SC, listed in Equation 4.5 was used to derive the marginal effects of *NDVI*, *cp*, and *gdd* on soybean yields, by taking the respective derivatives and evaluating them at the variables' means.

(Equation 4.5)

$$Yield = 4318.534 - 10648.65NDVI - 31.69274cp + 4.832407gdd + 6576.267NDVI^2$$
$$+.0368131cp^2 - .1174383gdd^2 + 40.50446cpNDVI - .1642622cpgdd$$

Again we see a negative marginal effect of *NDVI* on yields, when using the soybean data, with $\frac{\partial Yield}{\partial NDVI} = -5010.18$ as well as the expected positive relationship between *cp* and soybean yields, with $\frac{\partial Yield}{\partial cp} = 0.399$ This further suggests that NDVI is not accurately capturing changes in crop yields, nor is it accurately reflecting the effect of precipitation on crop yields.

Simple graphs showing the time series data for yields and NDVI for both corn and soy (Figures 4.1 and 4.2) do not show a clear relationship between the two datasets for either crop. For example, Figure 6.1 shows NDVI capturing the dip in corn yields in Saluda, SC in 1986, as well as increases in yields in 1987 and 1985. Yet NDVI fails to follow large drops in corn yields in 1983, 1993, and 2002.

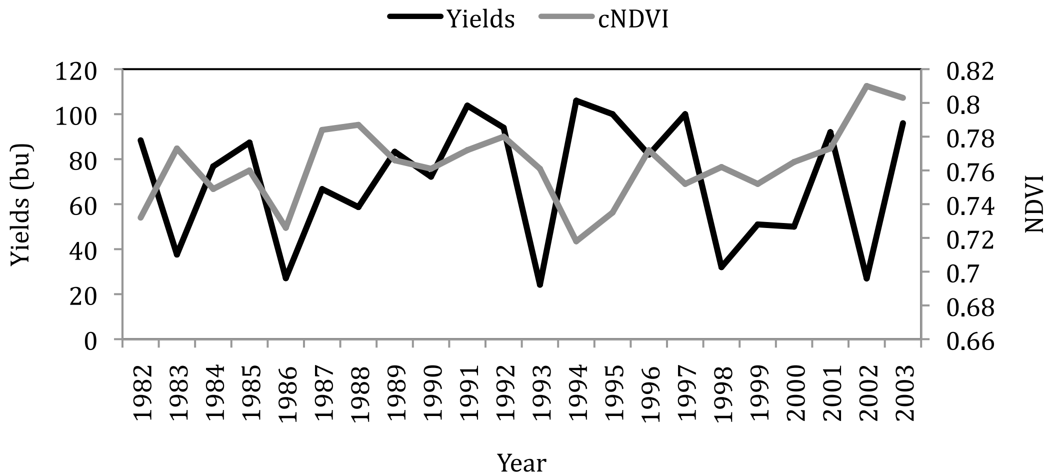

Figure 4.1. Corn Yields and NDVI for Saluda, SC

Likewise, in the case of soy, shown in Figure 4.2, NDVI is at its lowest at one of the years with the greatest yields, 1994. NDVI also does not capture the strong dips in soy yields in 1993,1998, and 2001.

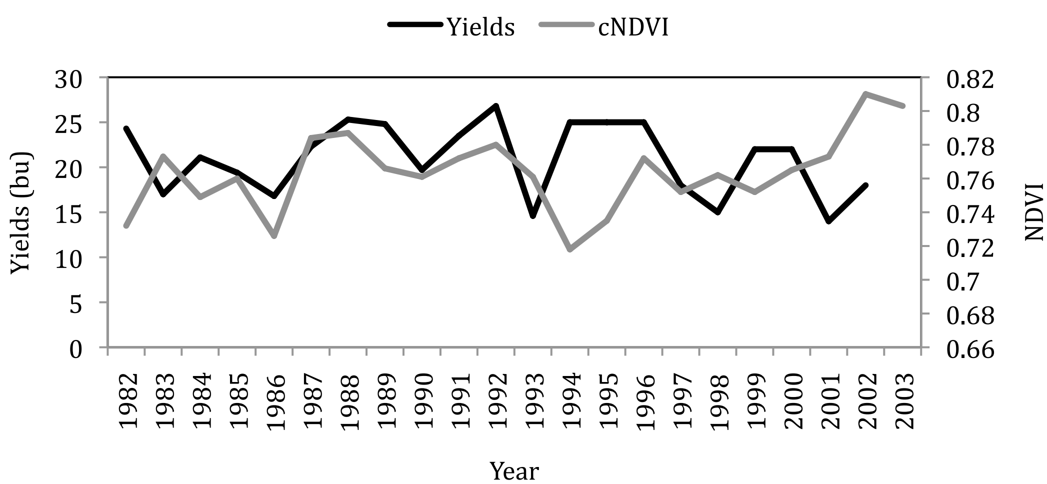

Figure 4.2. Soy Yields and NDVI for Saluda, SC

Case Study: Windsor, IL

Windsor, IL provides a different perspective on the relationship between NDVI and crop yields, than what we saw in Saluda, SC. In the case of this station, *NDVI* has a positive coefficient for both corn and soybean yields. The relationship is not statistically significant in the case of either crop. However, the model does have a good fit for both crops, with R^2 values of 0.7346 and 0.6746 for corn and soybeans, respectively. F-tests also show the model to have explanatory power. Signs on the coefficients of the other variables are consistent for both crops at this location, and are largely as expected, with the exception of the negative coefficient on $NDVI^2$. These results are shown in Tables 4.6 and 4.7.

Table 4.6. Results for Yields Regressed on NDVI and meteorological variables, for corn at Windsor, IL

Variable	β	Std. err.	t	P-value	95% Confidence Int.	
NDVI	2518.3	2868.266	0.88	0.397	-3731.114	8767.715
CP	9.5	48.91393	0.19	0.849	-97.05187	116.0967
GDD	-.5732	.9884681	-0.58	0.573	-2.72687	1.580504
$NDVI^2$	-1328.2	2101.81	-0.63	0.539	-5907.697	3251.202
CP^2	.3865585	.6925499	0.56	0.587	-1.122378	1.895495
GDD^2	.0001308	.000685	0.19	0.852	-.0013617	.0016232
CPNDVI	-22.4185	60.28347	-0.44	0.716	-153.7649	108.9278
GDDNDVI	.6550718	1.121387	-0.37	0.570	-1.78822	3.098363
CPGDD	-.012735	.0291876	0.58	0.670	-.0763288	.0508597
R^2						0.7346

Table 4.7. Results for Yields regressed on NDVI and meteorological variables, for soybeans at Windsor, IL

Variable	β	Std. err.	t	P-value	95% Confidence Int.	
NDVI	515.2734	724.6016	0.71	0.491	-1063.498	2094.045
CP	4.313011	15.71782	0.27	0.788	-29.93318	38.5592
GDD	-.0790699	.3274609	-0.24	0.813	-.7925459	.6344062
$NDVI^2$	-244.5751	557.5881	-0.44	0.669	-1459.455	970.305
CP^2	.0507554	.2178401	0.23	0.820	-.4238775	.5253882
GDD^2	.0000588	.0002837	0.21	0.839	-.0005595	.000677
CPNDVI	-6.399578	18.31468	-0.35	0.733	-46.30383	33.50468
GDDNDVI	.0670142	.3631861	0.18	0.857	-.7243004	.8583289
CPGDD	-.0021712	.012079	-0.18	0.860	-.0284891	.0241468
R^2						0.6746

Again, it is necessary to find the marginal effect of *NDVI*, *cp*, and *gdd* on NDVI to understand the relationships depicted by these regression results. The yield function for corn in Windsor, IL is given by

(Equation 4.6)

$$Yield = -949.01 + 2518.3NDVI + 9.5224cp - 0.5732gdd - 1328.2NDVI^2 + 0.38656cp^2 + 0.00013gdd^2$$
$$-22.4185cpNDVI + 0.65507gddNDVI - 0.012735cpgdd$$

and the equation for soy yield is as follows

(Equation 4.7)

$$Yield = -207.2024 + 515.2734NDVI + 4.313cp - 0.0791gdd - 244.5751NDVI^2 + .0507554cp^2 + .000059gdd^2$$
$$-6.3996cpNDVI + 0.067gddNDVI - 0.0022cpgdd$$

Evaluating the respective partial derivatives of this equation at the mean values for each variable, gives $\frac{\partial Yield}{\partial NDVI} = 1879.366$ and $\frac{\partial Yield}{\partial NDVI} = 247.98$ for corn and soybeans, respectively. While this shows the anticipated positive relationship between NDVI and yields, the marginal effect of *cp* on yields was negative in both the case of corn (-7.25) and soybeans (-0.8683). However, this is not unreasonable given that cumulative seasonal precipitation does not necessarily reflect periods of drought during critical growth phases, or large amounts of precipitation occurring during a short time period, which may not be beneficial to crop growth.

Examining the relationship between NDVI and yields at Windsor, IL by looking at graphs of the time series data (Figures 4.3. and 4.4.), the relationship appears to be somewhat stronger than was the case for Saluda, SC, but consistency is still lacking. In looking at corn yields, NDVI captures drops in yields in 1984, 1988, 1991, 1996, and 2002. However, it also experiences a drop during a year of increased yields, in 1994, 1998, and 2000. Additionally NDVI increases, during the drop in yields in 1983.

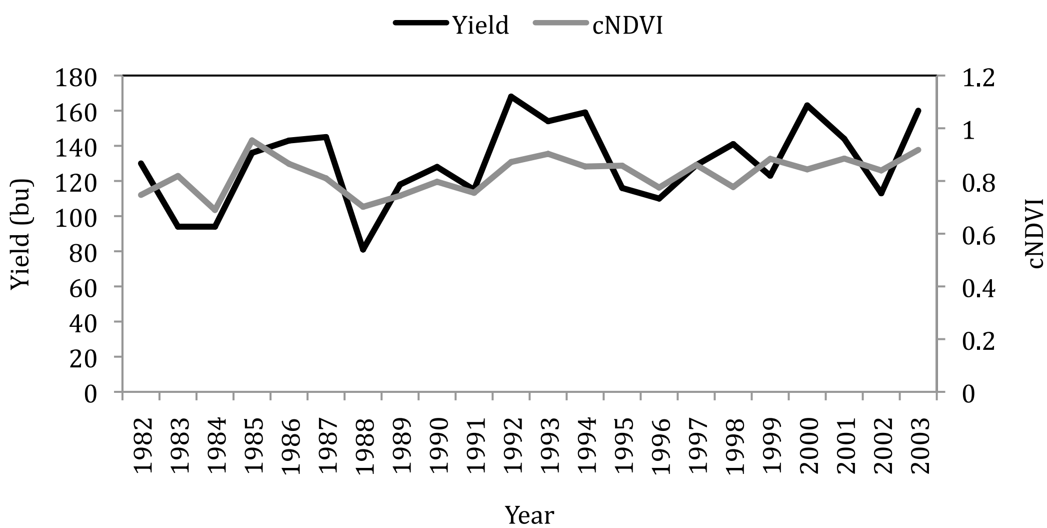

Figure 4.3 Corn Yields and NDVI for Windsor, IL

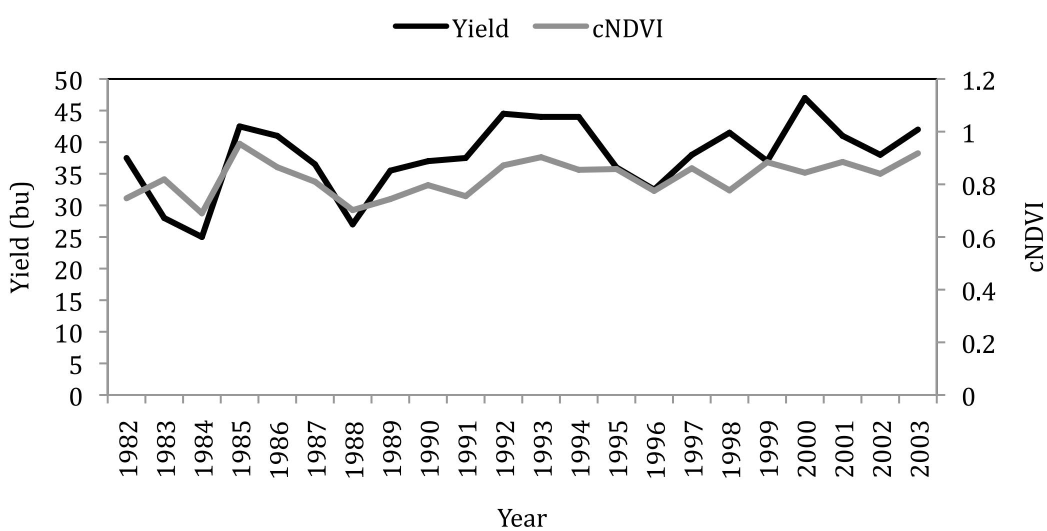

Figure 4.4 Soy Yields and NDVI for Windsor, IL

Similarly, soybean yields and NDVI in Windsor, IL appear to correspond for some fragments of time, yet ultimately show an inconsistent relationship. This can be seen with the increased NDVI values in 1983 and1999, both of which correspond to a decrease in yields for these years. Additionally, we see a drop in NDVI in1998 and 2000, both of which were years of increased soybean yield.

NDVI and Crop Indemnities

A simple index-based insurance contract using NDVI values

Though my regression analysis provided little evidence of a relationship between NDVI and crop yields that could be considered reliable for a range of locations, ultimately the question at hand is can years of anomalously great crop loss be captured by a NDVI-based trigger mechanism. To test this, I assessed the effectiveness of a simple NDVI-based contract in addressing major loss events by performing a Historical Burn Analysis. The contract would pay out when seasonal NDVI values were below a trigger value of *average NDVI -(0.25*standard deviation),* where *average NDVI* is the mean NDVI for the growing season. This design is similar to the design implemented by USDA RMA's Pasture, Forage and Rangeland program, where losses are measured as the difference between expected NDVI for a parcel of land and actual NDVI for that parcel during a critical growing period, and a trigger value is decided upon to render a payout.

For this example, I chose a quarter of a standard deviation below the average NDVI value for the location, because it provided a uniform rule that resulted in a payout frequency typical for an index-based agricultural insurance product (around 20-35%) for each of the locations aside from a select few. I confined the contract to NDVI values during the growing season defined as May 1 to August 15, as this was the closest to representing critical growing periods that could be applied across a wide variety of locations, each growing different crops at different times depending on their unique growing seasons. I used a Historical Burn Analysis to evaluate this contract for corn at each of the 25 locations, and for wheat, hay and soybeans at the locations where data was available.

With the exception of five stations (Dublin, GA, Beaverdam, KY, Eltopia, WA, and Fredonia, NY), all stations had a payout frequency ranging from 20 to 25 percent. When evaluating the contract in relation to corn yields, 0% to 71% of these payouts occurred in the lowest quarter of crop yields. 86 to 20% occurred in the lowest half of crop yields. Rockrapids, IA was the station where the contract best succeeded in capturing extreme crop loss events, with 71% of payouts falling in years in the lowest quarter of crop yields, and 86% occurring in years in the lowest half of crop yields. While, in Heppner, OR the contract failed to detect any of the years in the lowest quarter of crop yields, and captured only one of the events in the lowest half of crop yields. Table 4.8 presents general statistics on the relationship between payouts and indemnity events for corn crops at all of the locations.

Table 4.8 Payouts for NDVI-based insurance contract for corn (trigger at 0.5 standard deviations below average seasonal maximum NDVI value)

Station	Payout frequency	Worst ¼ of years	Worst ½ of years
Algona, IA	25%	40%	40%
Rockrapids, IA	35%	71%	86%
Saluda, SC	25%	20%	40%
Dublin, GA	40%	38%	38%
Booneville, MS	30%	50%	67%
Watervalley, MS	20%	50%	75%
Batesville, MS	30%	50%	67%
Yazoo City, MS	40%	13%	38%
Angelica, NY	35%	14%	29%
Riverhead, NY	35%	14%	43%
Fredonia, NY	50%	30%	50%
DuQUoin, IL	25%	40%	80%
Minonk, IL	25%	60%	80%
Ardmore, SD	30%	50%	50%
Windsor, IL	35%	57%	71%
WhiteHall, IL	30%	67%	83%
Beaverdam, KY	40%	50%	75%
Providence, KY	30%	33%	67%
Farmville, VA	30%	33%	67%
Heppner, OR	25%	0%	20%
Eltopia, WA	50%	50%	80%
Menomonie, WA	25%	60%	60%
Arlington, WI	35%	43%	71%
Sellingsgrove,PA	30%	17%	33%
Montrose, PA	35%	29%	43%

Figures 4.5 and 4.6 depict the timing of payouts for the NDVI-based insurance contract for corn for Saluda, SC and Windsor, IL. In the case of Saluda, SC only one of the five payouts occurred in a year exhibiting anomalously low crop yields. The other four payouts all occur in years with above-average corn yields.

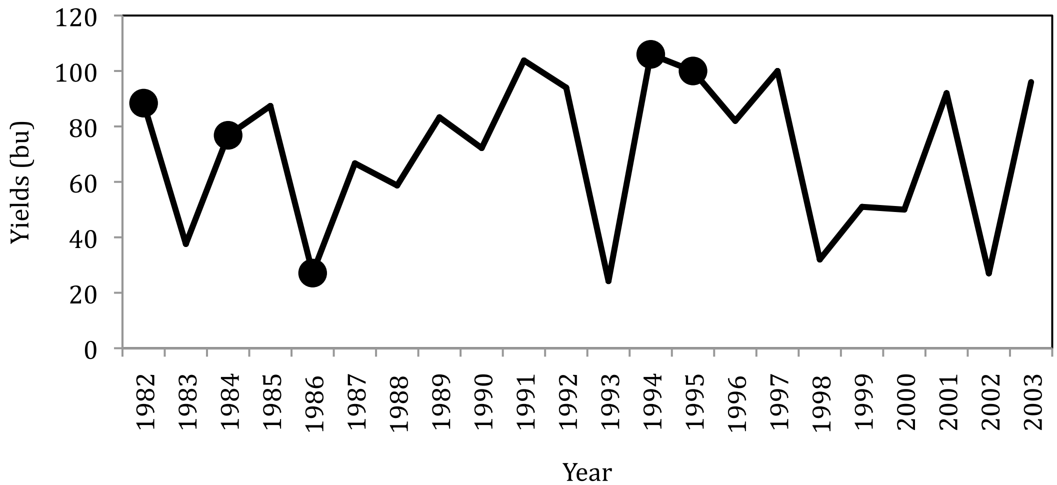

Figure 4.5. Corn Yields for Saluda, SC and payouts using NDVI-based insurance contract

The contract is more successful at targeting loss in the case of Windsor, IL. Here, no payouts occur in the years with the highest yields, and loss events, such as low crop yields in 1984 and 1988, are successfully captured by the contract. Additionally, years such as 1989, 1991, and 1996, which are in the lower half of yields, receive a payout. However, the contract does fail to capture 1983, a year of anomalously low yields.

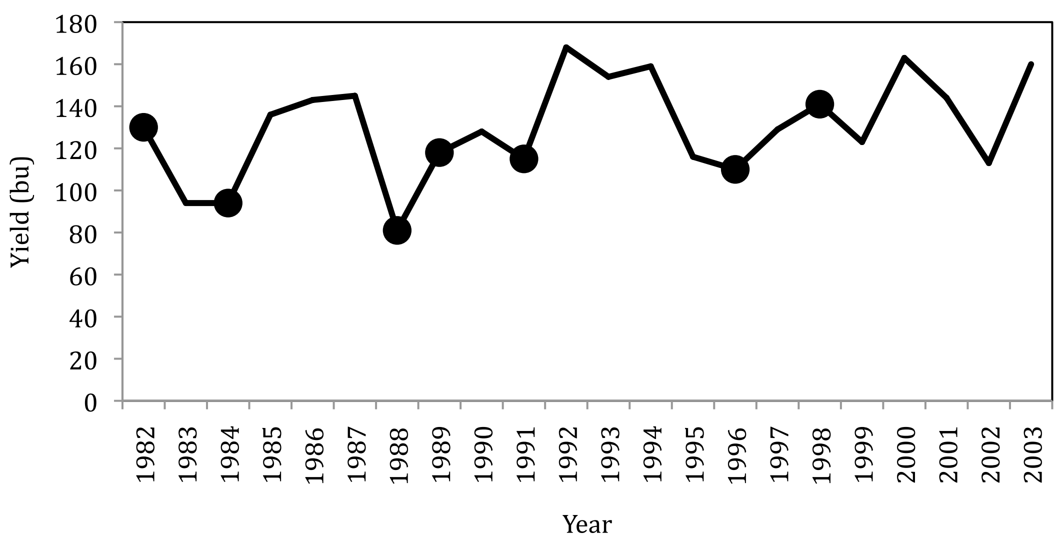

Figure 4.6. Corn Yields for Windsor, IL and payouts using NDVI-based insurance contract

Comparing contract payouts to hay, wheat, and soybean yields had similar results, with 0 to 80% of payouts occurring in the lowest quarter of wheat yields, 0 to 57% in the lowest quarter of hay yields, and 17 to 60% in the lowest quarter of soybean yields. The contract was best at capturing extreme wheat crop loss in Menomonie, WA (80% of payouts in the lowest quarter of yields, 100% in the lowest half). For hay yields, payouts were most often triggered in years with the greatest losses in Rockrapids, IA and Angelica, NY, where 57% of payouts were in the lowest quarter of yields, and 86% were in the lowest half for both cases. Algona, IA had the greatest percentage of payouts in the worst quarter of soy yields (60%), yet also had 40% of payouts in years in the highest half of soy yields, while Rock Rapids, IA and Windsor, IL had 86% of payouts occurring in the lowest half of crop yields.

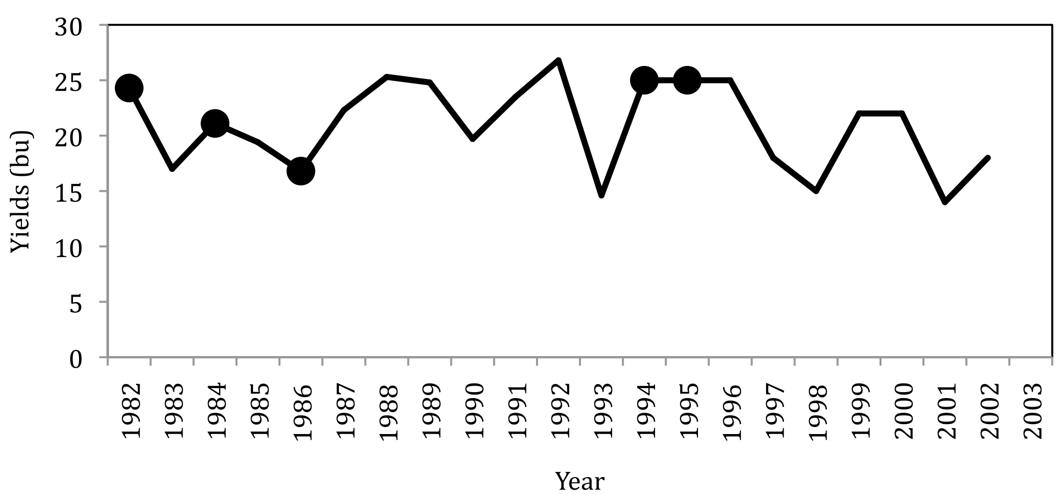

Figure 4.7. Soy Yields for Saluda, SC and payouts using NDVI-based insurance contract

The timing for the NDVI-based soybean contract for Saluda, SC is presented in Figure 4.7. As was the case of the corn contract in Saluda, only one payout occurs in a year of anomalously low crop yields. Three occur in years in the highest half of yields.

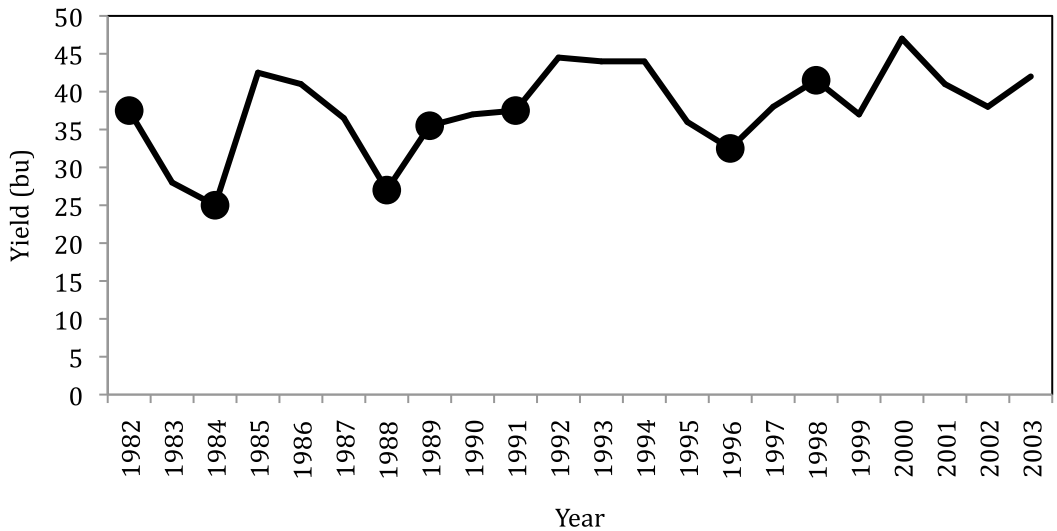

Figure 4.8. Soy yields for Windsor, IL and payouts using NDVI-based insurance contract

The NDVI-based contract for soybeans performed better at the Windsor, IL location. All but one of the payouts (1998) occur in years in the lowest half of yields, and four of the seven payouts (1984, 1988, 1989 and 1996) occur in years in the lowest quarter of yields. Figure 4.8 shows the timing of these events.

CHAPTER 5

Conclusion and Suggestions for Future research

NDVI and Precipitation

The relationship between raw NDVI data and precipitation differs depending on location, and likely many other factors outside the scope of this model. My results show NDVI to have a positive relationship with precipitation in some locations, while exhibiting a negative relationship in others. This is in line with both those studies finding a significant positive relationship between NDVI and precipitation (Wang et al. 2003, Thoma et al., Kennedy 1989), and those finding weaker, highly variable, or negative relationships between NDVI and precipitation (du Plessis 1989, Yang *et al.* 1998, Farrar *et al.* 1994). The quadratic form used in this study shows precipitation to be a significant variable affecting NDVI in very few locations within our study sample. This is in line with the literature showing a high variability in the strength of the relationship between precipitation and NDVI (du Plessis *et al.*1999, Hielkema *et al.*1986, Groton 1991).

It is important to note that prior studies finding strong relationships between NDVI and rainfall were mostly working in smaller regions, with study sites often restricted to one state or county. Additionally, most were working with a shorter time series of data, many comparing data spanning only two to three years.

NDVI and Extreme Heat

Results from this study show the relationship between NDVI and extreme heat to be highly variable among locations. Furthermore, the relationship between NDVI and extreme heat is likely not constant for the growing season. Wang et al. (2003) found temperature to be negatively correlated with NDVI during the middle of the growing season, while it was positively correlated with NDVI at the beginning and end. Such changes in the relationship between temperature and NDVI throughout the growing season may account for some of the variation in signs on coefficients for the *GDD* and GDD^2 variables. Additionally, prior studies have found NDVI to be both positively and negatively correlated with temperature interannually (Yang *et al*., Wang *et al.,* Zhou *et al*.). Given the assorted locations covered by this study, it is not surprising that my results agree with both findings.

The strength of the relationship between NDVI and extreme heat also differs depending on location. While extreme heat was a significant variable in some locations, in most cases it was not. This is likely the result of the interplay of many factors including interaction effects between temperature and precipitation, soil water content, potential evapotranspiration, and vegetation type. Though a complex crop model incorporating such factors may be able to explain the relationship between NDVI and temperature, NDVI alone does not reliably reflect instances of extreme heat across a wide variety of locations. This is not to say that NDVI cannot capture vegetation stress resulting from extreme heat in particular geographic areas.

NDVI and Crop Yields

The results of this study did not find a consistent relationship between NDVI and crop yields across study sites. Though the model had low coefficients of determination in some locations, in most it was able to effectively account for a large proportion of the variation in NDVI. Though all the sites in this study were comprised predominantly of farmland with little to no irrigation, many locations are growing multiple crops, others consist primarily of pasture, and many contain forested areas. I did not include data on technology changes or crop rotation, which have been evidenced to make NDVI less reliable in detecting trends in vegetation conditions over time (Atwood *et al.* 2005). Furthermore, using county level data may have weakened expressed relationships, as there are certain to be discrepancies between NDVI pixel location and county lines. Nonetheless, my results indicate that the relationship between NDVI and crop yields is not strong enough at the single-pixel level, such that it would not be disturbed or lost amidst changes in these sorts of factors.

Several studies have found NDVI is most effective when consolidating pixels covering an expansive area of land (de Plessis 1999, Rowley *et al*. 2007). Some have found NDVI to be most successful at capturing vegetative condition when estimated over an extended period of time (15 months, in the case of Wang *et al*. 2003) or when smoothing techniques are employed (du Plessis 1999). While these papers point to a strong underlying relationship between NDVI and vegetation condition, my results suggest NDVI is not particularly useful when looking at the smaller-scale, seasonal information relevant to index-based crop insurance products. This is consistent with other studies assessing the possibilities of using NDVI for index-based agricultural insurance, which found significant differences between farm-level experiences and NDVI values (Rowley *et al.* 2007, Makaudze and Miranda 2009). This is further evidenced by the weak ability of NDVI to capture years of extreme crop loss across locations, as seen by the historical Burn Analysis presented in Chapter 7.

General Conclusions on NDVI and Meteorological Variables

Relationships between NDVI and precipitation and extreme heat are highly variable in locations throughout the United States. This study was not able to find a reliable relationship between NDVI and precipitation or between NDVI and extreme heat that would justify the use of NDVI as a substitute for meteorological data in the development of index-based insurance products without careful consideration of *in situ* data and local calibration. While NDVI may be able to reliably reflect rainfall and extreme heat patterns in some locations, notably grasslands and pastures, the relationship is not as clear in mixed vegetation environments including cropland.

NDVI and index-based crop insurance

The relationship between seasonal maximum NDVI and crop indemnities, as well as seasonal integrated NDVI and crop indemnities is highly variable, and mostly weak for the sample of locations this study explored. From this, I conclude NDVI is not a product that can be applied broadly to estimate crop loss without location specific calibration reliant on *in situ* data.

Directions for Further Research

More research is needed exploring the time period and area size best suited to maximizing the strength of the relationship between NDVI, meteorological variables, and crop yields. Examining the relationship between NDVI during critical stages of crop growth and crop yields may provide useful information for insurance design. A better understanding of the connection between crop productivity and the condition of surrounding natural vegetation may also help to make NDVI a more useful tool in insurance product design, as it would allow the NDVI values to be aggregated over a larger area, a condition shown to contribute to more accurate NDVI responses.

As projects such as the Millennium Development Villages across regions of Africa have determined NDVI to effectively capture periods of stress undergone by natural vegetation and have found these periods to correspond directly to severe crop loss, setting aside plots of natural vegetation to use as markers for NDVI measurements may provide a method of eliminating some of the noise in NDVI measurements created by changes in land management practices and crop rotations. Sizeable plots of native vegetation, measuring 10kmx10km for example, may provide a stable measure of the fluctuations in vegetation condition caused by weather-related stress, which would also be affecting local crop yields. Such plots would in effect provide a form of local-calibration of NDVI data. Exploring the efficacy of this method in diverse regions with a multitude of agricultural practices, such as China and the United States would provide great insight into how NDVI can best be used in index-based agricultural insurance design.

APPENDIX A

Regression results for NDVI and meteorological variables

Ada, OK

```
Linear regression                                      Number of obs =     152
                                                       F( 32,   119) =    2.58
                                                       Prob > F      =  0.0001
                                                       R-squared     =  0.4291
                                                       Root MSE      =  .04287
```

ndvi_adaok	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0394435	.0213864	1.84	0.068	-.0029037	.0817907
year_1984	-.0427077	.0242026	-1.76	0.080	-.0906312	.0052158
year_1985	.0128649	.0313944	0.41	0.683	-.0492992	.075029
year_1986	-.0209095	.0284192	-0.74	0.463	-.0771823	.0353633
year_1987	.0313425	.0291725	1.07	0.285	-.0264219	.089107
year_1988	-.0094267	.0267219	-0.35	0.725	-.0623387	.0434854
year_1989	-.0106469	.0293555	-0.36	0.717	-.0687737	.0474799
year_1990	-.0029997	.0243532	-0.12	0.902	-.0512214	.045222
year_1991	.0047555	.0231668	0.21	0.838	-.0411171	.0506281
year_1992	.0453441	.0285352	1.59	0.115	-.0111584	.1018467
year_1993	.0100954	.0234531	0.43	0.668	-.0363441	.0565349
year_1994	.0259888	.0221882	1.17	0.244	-.0179461	.0699236
year_1995	.0196404	.02547	0.77	0.442	-.0307928	.0700736
year_1996	.0315804	.0298846	1.06	0.293	-.0275942	.0907549
year_1997	.0191106	.0269941	0.71	0.480	-.0343405	.0725617
year_1998	.0086192	.0442186	0.19	0.846	-.0789381	.0961765
year_1999	-.0257244	.0417958	-0.62	0.539	-.1084843	.0570355
year_2000	.0300921	.0220915	1.36	0.176	-.0136513	.0738356
year_2001	.0009579	.0290449	0.03	0.974	-.0565539	.0584698
year_2002	.0151968	.0252806	0.60	0.549	-.0348613	.0652549
year_2003	-.0286625	.0261299	-1.10	0.275	-.0804023	.0230774
may1631	.0129358	.0142785	0.91	0.367	-.0153371	.0412086
jun115	.0223834	.0177979	1.26	0.211	-.0128581	.057625
jun1630	.0109258	.0233547	0.47	0.641	-.0353189	.0571704
jul115	.0020891	.025836	0.08	0.936	-.0490689	.053247
jul1631	-.0007733	.0274087	-0.03	0.978	-.0550452	.0534986
aug115	-.0366179	.0278795	-1.31	0.192	-.091822	.0185863
cp_adaok	.0043377	.0089065	0.49	0.627	-.0132981	.0219736
gdd_adaok	.0001661	.0003552	0.47	0.641	-.0005373	.0008694
cp2_ada	-.0014831	.000979	-1.51	0.132	-.0034217	.0004554
gdd2_ada	-1.15e-06	1.20e-06	-0.96	0.339	-3.53e-06	1.22e-06
cpgdd_ada	.0000109	.0000576	0.19	0.850	-.0001032	.000125
_cons	.6288807	.0306546	20.52	0.000	.5681814	.6895799

Algona, IA

Linear regression

Number of obs =	152
F(32, 119) =	53.89
Prob > F =	0.0000
R-squared =	0.9209
Root MSE =	.05276

ndvi_algon~a	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0631536	.041626	1.52	0.132	-.01927	.1455772
year_1984	.0248295	.0313507	0.79	0.430	-.0372481	.0869071
year_1985	.0867977	.0322878	2.69	0.008	.0228647	.1507308
year_1986	.0915404	.0347672	2.63	0.010	.022698	.1603829
year_1987	.1327934	.0474371	2.80	0.006	.0388631	.2267237
year_1988	.140852	.0372587	3.78	0.000	.0670761	.214628
year_1989	.0585697	.0318819	1.84	0.069	-.0045597	.1216991
year_1990	.0411427	.0337416	1.22	0.225	-.0256692	.1079545
year_1991	-.030298	.0449792	-0.67	0.502	-.1193612	.0587653
year_1992	.0763801	.0381436	2.00	0.048	.0008519	.1519083
year_1993	-.0116888	.0348495	-0.34	0.738	-.0806942	.0573166
year_1994	.1370987	.0409116	3.35	0.001	.0560897	.2181078
year_1995	.0936568	.032826	2.85	0.005	.028658	.1586556
year_1996	.0468628	.039944	1.17	0.243	-.0322303	.1259559
year_1997	.0952371	.034762	2.74	0.007	.0264048	.1640694
year_1998	.1154962	.0353675	3.27	0.001	.045465	.1855274
year_1999	-.0686399	.0558113	-1.23	0.221	-.1791518	.0418721
year_2000	.0826229	.0406787	2.03	0.044	.002075	.1631708
year_2001	.0580147	.0346757	1.67	0.097	-.0106467	.1266762
year_2002	.0819909	.0359399	2.28	0.024	.0108263	.1531556
year_2003	.0658559	.0391773	1.68	0.095	-.011719	.1434308
may1631	.073524	.0166653	4.41	0.000	.040525	.1065229
jun115	.1399256	.0142536	9.82	0.000	.1117022	.1681491
jun1630	.2290266	.0187385	12.22	0.000	.1919224	.2661308
jul115	.3358135	.0140273	23.94	0.000	.308038	.3635891
jul1631	.4022277	.0150515	26.72	0.000	.3724242	.4320312
aug115	.422233	.0195217	21.63	0.000	.3835781	.460888
cp_algonaia	.0007647	.0122482	0.06	0.950	-.0234879	.0250173
gdd_algonaia	-.0008058	.0013247	-0.61	0.544	-.003429	.0018173
cp2_algona	-.0002153	.0022706	-0.09	0.925	-.0047113	.0042806
gdd2_algona	3.79e-06	.0000118	0.32	0.749	-.0000196	.0000272
cpgdd_algona	-2.68e-06	.000396	-0.01	0.995	-.0007868	.0007814
_cons	.3328285	.0361729	9.20	0.000	.2612026	.4044545

Harlan, IA

```
Linear regression                                      Number of obs =     152
                                                       F( 32,   119) =   65.70
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.9221
                                                       Root MSE      =  .05271
```

ndvi_harla~a	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0409646	.0295164	1.39	0.168	-.0174808	.09941
year_1984	.0155336	.0283862	0.55	0.585	-.040674	.0717412
year_1985	.0553047	.0278631	1.98	0.049	.0001331	.1104764
year_1986	.0586671	.0311813	1.88	0.062	-.0030751	.1204093
year_1987	.0968252	.0383873	2.52	0.013	.0208144	.1728359
year_1988	.1117614	.0357534	3.13	0.002	.0409662	.1825567
year_1989	.0258346	.0272867	0.95	0.346	-.0281958	.0798651
year_1990	.0355605	.0286514	1.24	0.217	-.021172	.0922931
year_1991	.0981805	.0327092	3.00	0.003	.033413	.162948
year_1992	.0430454	.0346576	1.24	0.217	-.0255802	.111671
year_1993	.0266755	.036312	0.73	0.464	-.0452258	.0985768
year_1994	.1169531	.0367396	3.18	0.002	.044205	.1897013
year_1995	.0262176	.0379576	0.69	0.491	-.0489422	.1013775
year_1996	.0063734	.0306385	0.21	0.836	-.0542939	.0670407
year_1997	.0778934	.0322136	2.42	0.017	.0141073	.1416795
year_1998	.0347102	.0363873	0.95	0.342	-.0373403	.1067606
year_1999	.0249719	.0367975	0.68	0.499	-.0478909	.0978347
year_2000	.0941059	.0406026	2.32	0.022	.0137086	.1745031
year_2001	.035328	.0349216	1.01	0.314	-.0338203	.1044763
year_2002	.0508182	.0382741	1.33	0.187	-.0249682	.1266047
year_2003	.03714	.0351861	1.06	0.293	-.032532	.106812
may1631	.065168	.013058	4.99	0.000	.0393119	.0910242
jun115	.1385205	.0153816	9.01	0.000	.1080633	.1689776
jun1630	.253638	.021064	12.04	0.000	.2119293	.2953468
jul115	.355915	.0229292	15.52	0.000	.3105128	.4013171
jul1631	.4163466	.0157949	26.36	0.000	.385071	.4476221
aug115	.4347577	.0186024	23.37	0.000	.3979231	.4715922
cp_harlania	.0071553	.01133	0.63	0.529	-.0152791	.0295898
gdd_harlania	-.0002341	.0008936	-0.26	0.794	-.0020035	.0015353
cp2_harlan	-.0013018	.0017644	-0.74	0.462	-.0047955	.0021919
gdd2_harlan	-1.11e-06	7.18e-06	-0.16	0.877	-.0000153	.0000131
cpgdd_harlan	-.0000366	.000219	-0.17	0.868	-.0004703	.0003971
_cons	.3220499	.0310559	10.37	0.000	.2605561	.3835437

Lamesa, TX

```
Linear regression                                      Number of obs =     153
                                                       F( 32,   120) =    5.73
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6576
                                                       Root MSE      =  .04742

------------------------------------------------------------------------------
             |             Robust HC3
ndvi_lames~x |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |  -.0647132   .0324342    -2.00   0.048    -.1289306   -.0004959
   year_1984 |  -.0518028   .0265306    -1.95   0.053    -.1043315     .000726
   year_1985 |    .040959   .0332348     1.23   0.220    -.0248436    .1067616
   year_1986 |   .0012476   .0318445     0.04   0.969    -.0618023    .0642975
   year_1987 |  -.0041769   .0355078    -0.12   0.907    -.0744799     .066126
   year_1988 |   .0467098   .0322429     1.45   0.150    -.0171289    .1105484
   year_1989 |  -.0630753   .0273823    -2.30   0.023    -.1172903   -.0088603
   year_1990 |  -.0350731   .0332311    -1.06   0.293    -.1008684    .0307221
   year_1991 |  -.0081645   .0252632    -0.32   0.747    -.0581838    .0418548
   year_1992 |    -.03945   .0322151    -1.22   0.223    -.1032337    .0243337
   year_1993 |   .0006648   .0274264     0.02   0.981    -.0536375    .0549672
   year_1994 |  -.0326194   .0310985    -1.05   0.296    -.0941922    .0289534
   year_1995 |  -.0054003   .0250366    -0.22   0.830    -.0549711    .0441705
   year_1996 |   .0189786   .0313236     0.61   0.546      -.04304    .0809972
   year_1997 |   .0868243   .0404346     2.15   0.034     .0067666     .166882
   year_1998 |  -.0012898   .0276141    -0.05   0.963    -.0559638    .0533842
   year_1999 |  -.0035865   .0331853    -0.11   0.914    -.0692911    .0621181
   year_2000 |   .0361655   .0352703     1.03   0.307    -.0336673    .1059983
   year_2001 |  -.0242203   .0326803    -0.74   0.460    -.0889251    .0404844
   year_2002 |   .0276534   .0433087     0.64   0.524    -.0580947    .1134016
   year_2003 |  -.0283396   .0335134    -0.85   0.399    -.0946938    .0380145
     may1631 |   .0010506   .0134609     0.08   0.938     -.025601    .0277023
      jun115 |   .0035763   .0133086     0.27   0.789    -.0227737    .0299264
     jun1630 |   .0161765   .0128504     1.26   0.211    -.0092664    .0416193
      jul115 |   .0464714   .0150247     3.09   0.002     .0167234    .0762193
     jul1631 |   .0772585   .0134597     5.74   0.000     .0506093    .1039077
      aug115 |   .1269956   .0199971     6.35   0.000     .0874028    .1665884
 cp_lamesatx |  -.0116525   .0116446    -1.00   0.319     -.034708    .0114031
gdd_lamesatx |  -.0026748   .0231391    -0.12   0.908    -.0484886     .043139
  cp2_lamesa |   .0029565   .0031275     0.95   0.346    -.0032358    .0091488
 gdd2_lamesa |   .0014639   .0033438     0.44   0.662    -.0051566    .0080844
cpgdd_lamesa |  -.0032679   .0096334    -0.34   0.735    -.0223414    .0158057
       _cons |   .2129291    .026119     8.15   0.000     .1612153    .2646429
------------------------------------------------------------------------------
```

Saluda, SC

Linear regression

Number of obs =	154
F(32, 121) =	1.86
Prob > F =	0.0087
R-squared =	0.3270
Root MSE =	.03797

ndvi_salud~c	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0133267	.0305208	-0.44	0.663	-.0737507	.0470973
year_1984	-.0146859	.0223718	-0.66	0.513	-.0589769	.029605
year_1985	-.0176807	.0257296	-0.69	0.493	-.0686191	.0332578
year_1986	-.0059804	.0216418	-0.28	0.783	-.0488261	.0368653
year_1987	.0313475	.0233169	1.34	0.181	-.0148144	.0775093
year_1988	.0122783	.0201745	0.61	0.544	-.0276624	.0522189
year_1989	.0158712	.0225831	0.70	0.484	-.0288379	.0605803
year_1990	-.0171496	.0284829	-0.60	0.548	-.073539	.0392398
year_1991	.019074	.0212967	0.90	0.372	-.0230884	.0612365
year_1992	.0103377	.0226208	0.46	0.648	-.0344462	.0551215
year_1993	.0130383	.024283	0.54	0.592	-.0350363	.0611129
year_1994	-.0223628	.02118	-1.06	0.293	-.0642942	.0195687
year_1995	-.0142158	.0235032	-0.60	0.546	-.0607466	.032315
year_1996	-.0109989	.0247652	-0.44	0.658	-.0600282	.0380304
year_1997	-.0058467	.0214018	-0.27	0.785	-.0482172	.0365238
year_1998	-.003443	.0282674	-0.12	0.903	-.0594057	.0525198
year_1999	-.0182898	.0251755	-0.73	0.469	-.0681314	.0315519
year_2000	.0019528	.0224424	0.09	0.931	-.0424778	.0463834
year_2001	-.0063269	.0266743	-0.24	0.813	-.0591356	.0464818
year_2002	.0062415	.0285401	0.22	0.827	-.0502612	.0627442
year_2003	.0161951	.0233219	0.69	0.489	-.0299768	.062367
may1631	-.0054063	.0119593	-0.45	0.652	-.029083	.0182703
jun115	-.0122848	.0101868	-1.21	0.230	-.0324522	.0078827
jun1630	-.0240404	.0124738	-1.93	0.056	-.0487355	.0006547
jul115	-.03439	.0134866	-2.55	0.012	-.0610902	-.0076897
jul1631	-.0416251	.0125139	-3.33	0.001	-.0663997	-.0168506
aug115	-.0505575	.0144319	-3.50	0.001	-.0791293	-.0219858
cp_saludasc	.0031002	.0061113	0.51	0.613	-.0089987	.0151991
gdd_saludasc	.008905	.2681629	0.03	0.974	-.5219943	.5398042
cp2_saluda	-.0008605	.0008776	-0.98	0.329	-.002598	.000877
gdd2_saluda	-.0009544	.0854286	-0.01	0.991	-.1700828	.1681739
cpgdd_saluda	.0050412	.0345609	0.15	0.884	-.0633812	.0734636
_cons	.7379652	.0221517	33.31	0.000	.6941101	.7818203

Rock Rapids, IA

```
Linear regression                                      Number of obs =     153
                                                       F( 30,   122) =   72.65
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.9335
                                                       Root MSE      =   .0524

------------------------------------------------------------------------------
             |             Robust HC3
ndvi_rockr~a |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |  -.0138923   .0335933    -0.41   0.680    -.0803937     .052609
   year_1984 |   .0018732   .0287426     0.07   0.948    -.0550256     .058772
   year_1985 |    .035515   .0267765     1.33   0.187    -.0174918    .0885219
   year_1986 |   .0569556   .0262506     2.17   0.032     .0049899    .1089214
   year_1987 |   .1002847   .0306703     3.27   0.001     .0395697    .1609997
   year_1988 |   .0896803   .0311473     2.88   0.005     .0280212    .1513395
   year_1989 |   .0355926   .0259829     1.37   0.173    -.0158432    .0870284
   year_1990 |   .0032282   .0277667     0.12   0.908    -.0517388    .0581953
   year_1991 |   .1280056   .0324872     3.94   0.000      .063694    .1923173
   year_1992 |   .0786272   .0260972     3.01   0.003     .0269651    .1302892
   year_1993 |  -.0443103   .0392263    -1.13   0.261    -.1219627    .0333422
   year_1994 |   .0859685   .0364828     2.36   0.020     .0137472    .1581898
   year_1995 |  -.0025993   .0358872    -0.07   0.942    -.0736417     .068443
   year_1996 |  -.0051174   .0376014    -0.14   0.892    -.0795531    .0693184
   year_1997 |  -.0169903   .0372852    -0.46   0.649    -.0908002    .0568195
   year_1998 |   .0954586   .0290562     3.29   0.001      .037939    .1529782
   year_1999 |   .0012651   .0463274     0.03   0.978    -.0904446    .0929749
   year_2000 |   .0547668   .0315271     1.74   0.085    -.0076443    .1171779
   year_2001 |   .0135513   .0372246     0.36   0.716    -.0601384    .0872411
   year_2002 |   .0420045   .0328747     1.28   0.204    -.0230743    .1070833
   year_2003 |   .0393455   .0267588     1.47   0.144    -.0136262    .0923172
     may1631 |    .062077   .0140662     4.41   0.000     .0342316    .0899225
      jun115 |   .1478951   .0162498     9.10   0.000      .115727    .1800632
     jun1630 |   .2506634   .0180232    13.91   0.000     .2149847    .2863422
      jul115 |   .3574937   .0163748    21.83   0.000     .3250782    .3899093
     jul1631 |   .4406912   .0186104    23.68   0.000       .40385    .4775323
      aug115 |   .4630505   .0158626    29.19   0.000     .4316489    .4944522
cp_rockrap~a |   .0042336   .0136082     0.31   0.756    -.0227052    .0311725
gdd_rockra~a |  (dropped)
cp2_rockra~s |  -.0007978   .0027305    -0.29   0.771    -.0062031    .0046075
gdd2_rockr~s |   .0001163   .0006266     0.19   0.853    -.0011241    .0013568
cpgdd_rock~s |  (dropped)
       _cons |   .3298454   .0274812    12.00   0.000     .2754435    .3842473
------------------------------------------------------------------------------
```

Osage, IA

Linear regression

Number of obs	= 154
F(32, 121)	= 31.19
Prob > F	= 0.0000
R-squared	= 0.8326
Root MSE	= .07938

ndvi_osageia	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0164564	.0304734	-0.54	0.590	-.0767864	.0438737
year_1984	.0498406	.0363174	1.37	0.172	-.0220593	.1217405
year_1985	.057668	.037081	1.56	0.123	-.0157437	.1310797
year_1986	.0511312	.034205	1.49	0.138	-.0165866	.1188489
year_1987	.0804482	.0452204	1.78	0.078	-.0090776	.1699739
year_1988	.1032706	.0399327	2.59	0.011	.0242133	.1823278
year_1989	.0408183	.0397694	1.03	0.307	-.0379157	.1195523
year_1990	.0546896	.0344535	1.59	0.115	-.0135202	.1228993
year_1991	.058003	.0328898	1.76	0.080	-.007111	.1231169
year_1992	.0512332	.0298257	1.72	0.088	-.0078146	.110281
year_1993	-.0138394	.0367382	-0.38	0.707	-.0865724	.0588936
year_1994	.0813703	.0343629	2.37	0.019	.0133399	.1494007
year_1995	.0611683	.0372612	1.64	0.103	-.0126	.1349366
year_1996	-.0917982	.0907089	-1.01	0.314	-.2713804	.0877839
year_1997	.0106676	.0441193	0.24	0.809	-.0766782	.0980133
year_1998	.0252325	.0339919	0.74	0.459	-.0420633	.0925284
year_1999	-.1106733	.0474019	-2.33	0.021	-.2045179	-.0168288
year_2000	-.0935542	.0529115	-1.77	0.080	-.1983064	.011198
year_2001	-.0280956	.0371694	-0.76	0.451	-.1016823	.0454911
year_2002	.0579556	.0305697	1.90	0.060	-.0025653	.1184764
year_2003	-.0478332	.073356	-0.65	0.516	-.1930608	.0973944
may1631	.0674751	.0188541	3.58	0.000	.0301484	.1048018
jun115	.1379693	.0225097	6.13	0.000	.0934055	.1825332
jun1630	.2496278	.0229949	10.86	0.000	.2041034	.2951522
jul115	.350077	.0237315	14.75	0.000	.3030942	.3970598
jul1631	.36856	.0393416	9.37	0.000	.2906729	.446447
aug115	.41341	.0306637	13.48	0.000	.352703	.474117
cp_osageia	.0122178	.0249823	0.49	0.626	-.0372412	.0616768
gdd_osageia	.0007108	.001246	0.57	0.569	-.001756	.0031775
cp2_osage	.0007253	.0045143	0.16	0.873	-.0082119	.0096626
gdd2_osage	-5.09e-06	9.62e-06	-0.53	0.598	-.0000241	.000014
cpgdd_osage	-.0004949	.0002327	-2.13	0.035	-.0009555	-.0000343
_cons	.3481433	.0394637	8.82	0.000	.2700145	.4262721

Allendale, SC

Linear regression

Number of obs	=	150
F(32, 117)	=	2.15
Prob > F	=	0.0017
R-squared	=	0.3351
Root MSE	=	.04489

ndvi_allen~c	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0377035	.0288002	1.31	0.193	-.0193339	.0947409
year_1984	.0151818	.0314977	0.48	0.631	-.0471977	.0775613
year_1985	.0069148	.0366769	0.19	0.851	-.0657218	.0795514
year_1986	-.0231008	.0262304	-0.88	0.380	-.0750488	.0288471
year_1987	.0191538	.0283644	0.68	0.501	-.0370205	.0753281
year_1988	-.003618	.0258504	-0.14	0.889	-.0548134	.0475774
year_1989	.0231153	.0230725	1.00	0.318	-.0225785	.0688091
year_1990	.0432666	.0285907	1.51	0.133	-.0133558	.0998891
year_1991	.0544657	.0266061	2.05	0.043	.0017738	.1071576
year_1992	.0437995	.0232691	1.88	0.062	-.0022839	.0898828
year_1993	-.0214545	.0260782	-0.82	0.412	-.073101	.0301921
year_1994	-.0415796	.0364549	-1.14	0.256	-.1137765	.0306173
year_1995	.0221335	.0282509	0.78	0.435	-.033816	.078083
year_1996	.0591521	.0247581	2.39	0.018	.01012	.1081842
year_1997	.0191817	.0287888	0.67	0.507	-.0378331	.0761965
year_1998	.0388658	.0288853	1.35	0.181	-.0183401	.0960717
year_1999	.0003478	.0346925	0.01	0.992	-.0683589	.0690545
year_2000	.0033286	.0328328	0.10	0.919	-.061695	.0683523
year_2001	.0470589	.0286984	1.64	0.104	-.0097769	.1038946
year_2002	.0509944	.0422889	1.21	0.230	-.0327566	.1347454
year_2003	.0243069	.0312664	0.78	0.438	-.0376146	.0862284
may1631	-.0099237	.0140733	-0.71	0.482	-.0377952	.0179478
jun115	-.0131857	.0152069	-0.87	0.388	-.0433022	.0169307
jun1630	-.0132851	.0136152	-0.98	0.331	-.0402492	.0136791
jul115	-.0016947	.015873	-0.11	0.915	-.0331303	.0297409
jul1631	-.0128539	.0182726	-0.70	0.483	-.0490419	.0233341
aug115	.0048848	.0159478	0.31	0.760	-.0266989	.0364685
cp_allenda~c	-.0092542	.0077681	-1.19	0.236	-.0246385	.00613
gdd_allend~c	-.0265661	.0120217	-2.21	0.029	-.0503744	-.0027579
cp2_allend~e	.001274	.0011796	1.08	0.282	-.0010621	.0036101
gdd2_allen~e	.0022896	.0009333	2.45	0.016	.0004413	.0041379
cpgdd_alle~e	.0067721	.0038107	1.78	0.078	-.0007747	.014319
_cons	.6253214	.0253548	24.66	0.000	.5751075	.6755352

Pelion, SC

Linear regression

Number of obs	= 152
F(32, 119)	= 1.31
Prob > F	= 0.1475
R-squared	= 0.2878
Root MSE	= .05257

ndvi_pelio~c	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0174782	.028806	0.61	0.545	-.0395605	.0745169
year_1984	.0569112	.0262224	2.17	0.032	.0049883	.1088342
year_1985	.0030455	.0359633	0.08	0.933	-.0681654	.0742565
year_1986	-.0287244	.0258732	-1.11	0.269	-.0799559	.0225072
year_1987	.0137118	.0265692	0.52	0.607	-.0388979	.0663214
year_1988	.0237045	.0338449	0.70	0.485	-.0433119	.0907208
year_1989	.0207856	.0252275	0.82	0.412	-.0291674	.0707385
year_1990	.0391238	.03228	1.21	0.228	-.0247937	.1030414
year_1991	.0086384	.0289854	0.30	0.766	-.0487556	.0660324
year_1992	.0032081	.0259884	0.12	0.902	-.0482514	.0546677
year_1993	.0088595	.0324147	0.27	0.785	-.0553249	.0730439
year_1994	-.00338	.0306049	-0.11	0.912	-.0639807	.0572206
year_1995	-.0363089	.0363323	-1.00	0.320	-.1082506	.0356327
year_1996	.0433411	.0282803	1.53	0.128	-.0126566	.0993389
year_1997	.040136	.0348596	1.15	0.252	-.0288895	.1091614
year_1998	.0397993	.033354	1.19	0.235	-.026245	.1058435
year_1999	-.0161902	.0576511	-0.28	0.779	-.1303451	.0979647
year_2000	.0328968	.0296082	1.11	0.269	-.0257304	.091524
year_2001	.0280634	.0265045	1.06	0.292	-.0244182	.080545
year_2002	.0503189	.0375643	1.34	0.183	-.0240621	.1246999
year_2003	.0311154	.0256802	1.21	0.228	-.019734	.0819648
may1631	-.0073731	.0173353	-0.43	0.671	-.0416988	.0269525
jun115	-.0235228	.0218173	-1.08	0.283	-.0667233	.0196777
jun1630	-.0403938	.02724	-1.48	0.141	-.0943317	.0135442
jul115	-.0342622	.0283007	-1.21	0.228	-.0903004	.021776
jul1631	-.053627	.0293381	-1.83	0.070	-.1117193	.0044653
aug115	-.0273682	.0275049	-1.00	0.322	-.0818306	.0270942
cp_pelionsc	-.0024774	.0130525	-0.19	0.850	-.0283227	.0233679
gdd_pelionsc	-.0006508	.0007334	-0.89	0.377	-.002103	.0008014
cp2_pelion	-.0004042	.001129	-0.36	0.721	-.0026398	.0018314
gdd2_pelion	4.12e-06	2.69e-06	1.53	0.129	-1.21e-06	9.45e-06
cpgdd_pelion	.0000633	.0000882	0.72	0.475	-.0001114	.0002379
_cons	.5713447	.0396223	14.42	0.000	.4928885	.6498008

Dublin, GA

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Linear regression                                      Number of obs =     153
                                                       F( 32,   120) =    1.32
                                                       Prob > F      =  0.1470
                                                       R-squared     =  0.3116
                                                       Root MSE      =  .04107

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             |             Robust HC3
ndvi_dubli~a |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |   .0289745   .0325073     0.89   0.375    -.0353876    .0933367
   year_1984 |   .0787168   .0313205     2.51   0.013     .0167044    .1407291
   year_1985 |   .0605293    .028331     2.14   0.035      .004436    .1166227
   year_1986 |   .0507824   .0246908     2.06   0.042     .0018964    .0996684
   year_1987 |   .0877314   .0303897     2.89   0.005     .0275619    .1479009
   year_1988 |   .0209702   .0313666     0.67   0.505    -.0411335    .0830739
   year_1989 |   .0742932   .0231785     3.21   0.002     .0284014    .1201851
   year_1990 |   .0531916   .0212985     2.50   0.014     .0110222    .0953611
   year_1991 |   .0641644   .0229702     2.79   0.006      .018685    .1096438
   year_1992 |   .0708557   .0236809     2.99   0.003     .0239691    .1177422
   year_1993 |   .0797783   .0267811     2.98   0.004     .0267536     .132803
   year_1994 |   .0658798   .0227668     2.89   0.005     .0208031    .1109564
   year_1995 |   .0690353   .0231058     2.99   0.003     .0232873    .1147832
   year_1996 |   .0607522   .0258925     2.35   0.021     .0094868    .1120176
   year_1997 |   .0594048   .0263079     2.26   0.026      .007317    .1114926
   year_1998 |   .0557818   .0224136     2.49   0.014     .0114043    .1001593
   year_1999 |   .0098038   .0266576     0.37   0.714    -.0429763     .062584
   year_2000 |   .0534614   .0264946     2.02   0.046      .001004    .1059188
   year_2001 |   .0170087   .0309648     0.55   0.584    -.0442994    .0783168
   year_2002 |   .0473914   .0234915     2.02   0.046     .0008798     .093903
   year_2003 |   .0514777   .0237309     2.17   0.032     .0044921    .0984633
     may1631 |  -.0096795   .0114107    -0.85   0.398     -.032272    .0129129
      jun115 |  -.0207894   .0132803    -1.57   0.120    -.0470834    .0055046
     jun1630 |  -.0114478   .0106516    -1.07   0.285    -.0325372    .0096416
      jul115 |  -.0112703   .0126047    -0.89   0.373    -.0362266    .0136861
     jul1631 |  -.0004774   .0130368    -0.04   0.971    -.0262894    .0253346
      aug115 |  -.0046704   .0153921    -0.30   0.762    -.0351457    .0258048
  cp_dublinga |  -.0065288   .0086248    -0.76   0.451    -.0236053    .0105478
 gdd_dublinga |   .0012266   .0023049     0.53   0.596     -.003337    .0057902
   cp2_dublin |   .0000732   .0016659     0.04   0.965    -.0032252    .0033716
  gdd2_dublin |  -9.44e-06   .0000742    -0.13   0.899    -.0001563    .0001374
 cpgdd_dublin |  -.0006931   .0006593    -1.05   0.295    -.0019986    .0006123
       _cons |   .5826568   .0210405    27.69   0.000      .540998    .6243156
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Siloam, GA

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Linear regression                                      Number of obs =     150
                                                       F( 32,   117) =    2.06
                                                       Prob > F      =  0.0029
                                                       R-squared     =  0.3752
                                                       Root MSE      =  .05103

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             |               Robust HC3
ndvi_siloa~a |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |  -.0181615   .0303225    -0.60   0.550    -.0782136    .0418906
   year_1984 |   .0091696    .027476     0.33   0.739    -.0452452    .0635844
   year_1985 |   .0304348   .0301616     1.01   0.315    -.0292987    .0901683
   year_1986 |  -.0331455   .0326907    -1.01   0.313    -.0978878    .0315968
   year_1987 |   .0328917   .0254032     1.29   0.198     -.017418    .0832014
   year_1988 |  -.0498088   .0493309    -1.01   0.315     -.147506    .0478884
   year_1989 |   .0330712   .0348717     0.95   0.345    -.0359903    .1021327
   year_1990 |    .002065   .0296443     0.07   0.945    -.0566439    .0607739
   year_1991 |  -.0105017   .0364102    -0.29   0.774    -.0826102    .0616067
   year_1992 |   .0266743   .0327924     0.81   0.418    -.0382694    .0916179
   year_1993 |   .0022566   .0281284     0.08   0.936    -.0534503    .0579635
   year_1994 |  -.0410583   .0307072    -1.34   0.184    -.1018724    .0197558
   year_1995 |   .0262753   .0254434     1.03   0.304    -.0241141    .0766646
   year_1996 |   .0408565     .02721     1.50   0.136    -.0130314    .0947444
   year_1997 |   .0501992   .0252326     1.99   0.049     .0002273    .1001711
   year_1998 |   .0409059   .0292174     1.40   0.164    -.0169578    .0987695
   year_1999 |   .0123601   .0322683     0.38   0.702    -.0515455    .0762658
   year_2000 |   .0020515   .0263229     0.08   0.938    -.0500797    .0541827
   year_2001 |   .0121016    .028393     0.43   0.671    -.0441293    .0683325
   year_2002 |   .0336243   .0268402     1.25   0.213    -.0195314      .08678
   year_2003 |   .0067823   .0753085     0.09   0.928    -.1423623    .1559268
     may1631 |  -.0060882   .0174725    -0.35   0.728    -.0406915    .0285151
      jun115 |  -.0134723   .0144736    -0.93   0.354    -.0421365    .0151918
     jun1630 |  -.0301852   .0193738    -1.56   0.122     -.068554    .0081835
      jul115 |  -.0418718    .017829    -2.35   0.021    -.0771812   -.0065624
     jul1631 |  -.0526073   .0171672    -3.06   0.003     -.086606   -.0186085
      aug115 |  -.0506844   .0201352    -2.52   0.013    -.0905612   -.0108076
 cp_siloamga |  -.0078895   .0114937    -0.69   0.494    -.0306521    .0148731
gdd_siloamga |   .0021886   .0013844     1.58   0.117    -.0005531    .0049302
  cp2_siloam |   .0003326   .0022777     0.15   0.884    -.0041781    .0048434
 gdd2_siloam |  -.0000113   9.40e-06    -1.21   0.230      -.00003    7.28e-06
cpgdd_siloam |   -.000287   .0004265    -0.67   0.502    -.0011318    .0005577
       _cons |   .7285777   .0245159    29.72   0.000     .6800253    .7771301
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Talbottan, GA

Linear regression

Number of obs =	149
F(32, 116) =	3.67
Prob > F =	0.0000
R-squared =	0.4928
Root MSE =	.03956

ndvi_talbo~a	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0302649	.0286938	1.05	0.294	-.0265668	.0870966
year_1984	.0473669	.0317344	1.49	0.138	-.015487	.1102208
year_1985	.0198394	.0260493	0.76	0.448	-.0317545	.0714333
year_1986	-.0067956	.0304178	-0.22	0.824	-.0670419	.0534507
year_1987	.0372574	.0324249	1.15	0.253	-.0269641	.101479
year_1988	-.0027883	.0339703	-0.08	0.935	-.0700708	.0644941
year_1989	.0571335	.0312748	1.83	0.070	-.0048102	.1190772
year_1990	.0386001	.0273944	1.41	0.161	-.0156579	.0928582
year_1991	.0288123	.0298876	0.96	0.337	-.0303838	.0880083
year_1992	.0363252	.0282008	1.29	0.200	-.0195301	.0921805
year_1993	.0329307	.026671	1.23	0.219	-.0198945	.0857559
year_1994	-.0070901	.0325205	-0.22	0.828	-.071501	.0573208
year_1995	.0324268	.033154	0.98	0.330	-.0332389	.0980925
year_1996	.0424042	.0319374	1.33	0.187	-.0208518	.1056603
year_1997	.0161714	.0299808	0.54	0.591	-.0432094	.0755523
year_1998	.0499314	.0293432	1.70	0.092	-.0081866	.1080493
year_1999	.0211974	.0355069	0.60	0.552	-.0491284	.0915233
year_2000	.0468102	.0274304	1.71	0.091	-.0075192	.1011397
year_2001	.0329025	.0314585	1.05	0.298	-.0294051	.09521
year_2002	.0603158	.0387041	1.56	0.122	-.0163425	.1369742
year_2003	.0538615	.0355701	1.51	0.133	-.0165897	.1243126
may1631	.0004039	.0109333	0.04	0.971	-.0212508	.0220587
jun115	-.0050624	.0122866	-0.41	0.681	-.0293975	.0192727
jun1630	-.0208266	.0152005	-1.37	0.173	-.0509331	.0092798
jul115	-.0414037	.0142316	-2.91	0.004	-.0695913	-.0132162
jul1631	-.0639083	.0128931	-4.96	0.000	-.0894447	-.038372
aug115	-.0611223	.0143987	-4.24	0.000	-.0896406	-.0326039
cp_talbott~a	-.0066123	.0063538	-1.04	0.300	-.0191967	.0059721
gdd_talbot~a	.0004375	.0004626	0.95	0.346	-.0004787	.0013537
cp2_talbot~n	.0007366	.0006805	1.08	0.281	-.0006113	.0020845
gdd2_talbo~n	-9.14e-07	2.68e-06	-0.34	0.734	-6.23e-06	4.40e-06
cpgdd_talb~n	-.000135	.0001014	-1.33	0.185	-.0003358	.0000657
_cons	.7482175	.0259556	28.83	0.000	.6968093	.7996258

Yazoo City, MS

Linear regression

Number of obs	= 154
F(32, 121)	= 253.20
Prob > F	= 0.0000
R-squared	= 0.9896
Root MSE	= .00952

ndvi_yazooms	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0003717	.0029251	-0.13	0.899	-.0061627	.0054194
year_1984	-.0013491	.0080752	-0.17	0.868	-.017336	.0146379
year_1985	-.0005365	.0030707	-0.17	0.862	-.0066158	.0055429
year_1986	.0052959	.0035429	1.49	0.138	-.0017182	.0123101
year_1987	-.0026026	.0045615	-0.57	0.569	-.0116332	.006428
year_1988	-.0044786	.0048031	-0.93	0.353	-.0139876	.0050305
year_1989	-.0062363	.0073802	-0.84	0.400	-.0208473	.0083748
year_1990	.0034961	.0026485	1.32	0.189	-.0017473	.0087394
year_1991	-.0107852	.0104111	-1.04	0.302	-.0313967	.0098262
year_1992	.0011311	.0050033	0.23	0.822	-.0087742	.0110363
year_1993	.0012975	.0031179	0.42	0.678	-.0048753	.0074703
year_1994	-.0039847	.0043487	-0.92	0.361	-.012594	.0046247
year_1995	.0032002	.0033178	0.96	0.337	-.0033684	.0097687
year_1996	-.0077594	.0031754	-2.44	0.016	-.0140459	-.0014728
year_1997	.0029369	.0035451	0.83	0.409	-.0040816	.0099554
year_1998	.0028569	.0028013	1.02	0.310	-.0026891	.0084029
year_1999	.0012285	.0058298	0.21	0.833	-.0103131	.01277
year_2000	.0020908	.0024621	0.85	0.397	-.0027836	.0069652
year_2001	.000558	.0027438	0.20	0.839	-.004874	.00599
year_2002	.003831	.0027346	1.40	0.164	-.0015828	.0092448
year_2003	.0044422	.0028898	1.54	0.127	-.0012788	.0101633
may1631	-.0094498	.0046087	-2.05	0.042	-.0185739	-.0003256
jun115	-.0041086	.0024825	-1.66	0.101	-.0090234	.0008062
jun1630	-.0012872	.0029808	-0.43	0.667	-.0071884	.004614
jul115	.0003403	.0023105	0.15	0.883	-.0042339	.0049145
jul1631	.0016586	.0024858	0.67	0.506	-.0032627	.00658
aug115	.001455	.0020109	0.72	0.471	-.0025261	.005436
cp_yazooms	.0001249	.0005316	0.23	0.815	-.0009275	.0011773
gdd_yazooms	.0026336	.0061863	0.43	0.671	-.0096138	.014881
cp2_yazooms	.7745471	.0287666	26.93	0.000	.717596	.8314981
gdd2_yazooms	1.38e-06	.000017	0.08	0.935	-.0000323	.0000351
cpgdd_yazo~s	-.0038551	.0082394	-0.47	0.641	-.0201671	.0124569
_cons	.316214	.0159061	19.88	0.000	.2847236	.3477044

Batesville, MS

Linear regression

Number of obs =	153
F(20, 121) =	.
Prob > F =	.
R-squared =	0.9937
Root MSE =	.00533

ndvi_bates~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0004706	.0031245	0.15	0.881	-.0057152	.0066563
year_1984	-.0005206	.0031191	-0.17	0.868	-.0066958	.0056545
year_1985	.0004626	.0029194	0.16	0.874	-.0053171	.0062422
year_1986	.0001382	.0030011	0.05	0.963	-.0058032	.0060795
year_1987	.0013427	.006977	0.19	0.848	-.0124701	.0151555
year_1988	-.0008812	.0035263	-0.25	0.803	-.0078626	.0061001
year_1989	.000076	.004701	0.02	0.987	-.0092309	.0093828
year_1990	.0010678	.0039504	0.27	0.787	-.0067531	.0088888
year_1991	-.0002703	.0026335	-0.10	0.918	-.005484	.0049434
year_1992	-.0014491	.0051739	-0.28	0.780	-.0116922	.008794
year_1993	.0009648	.0038402	0.25	0.802	-.0066379	.0085676
year_1994	-.0010404	.0042483	-0.24	0.807	-.009451	.0073702
year_1995	-.0017028	.0058069	-0.29	0.770	-.0131991	.0097934
year_1996	-.0019051	.0061775	-0.31	0.758	-.0141352	.010325
year_1997	-.0006085	.0032298	-0.19	0.851	-.0070028	.0057859
year_1998	-.0010325	.004092	-0.25	0.801	-.0091337	.0070687
year_1999	-.0176013	.0508364	-0.35	0.730	-.1182454	.0830428
year_2000	-.0001124	.0030158	-0.04	0.970	-.0060829	.0058582
year_2001	.0020182	.0062261	0.32	0.746	-.0103079	.0143444
year_2002	-.0015994	.0054697	-0.29	0.770	-.0124281	.0092293
year_2003	-.0001954	.0024546	-0.08	0.937	-.0050549	.004664
may1631	-.0038282	.0111382	-0.34	0.732	-.0258791	.0182227
jun115	-.002187	.0063443	-0.34	0.731	-.0147472	.0103733
jun1630	-.0011698	.0035954	-0.33	0.745	-.0082878	.0059481
jul115	.0002323	.0016562	0.14	0.889	-.0030466	.0035112
jul1631	-.0015707	.0047605	-0.33	0.742	-.0109954	.0078539
aug115	-.0026228	.0076125	-0.34	0.731	-.0176938	.0124482
cp_batesvi~s	.000434	.00128	0.34	0.735	-.0021	.0029681
gdd_batesv~s	(dropped)					
cp2_batesv~s	.8311767	2.360074	0.35	0.725	-3.841212	5.503565
gdd2_bates~s	.0003854	22035.62	0.00	1.000	-43625.32	43625.32
cpgdd_bate~s	-.0054431	283933.8	-0.00	1.000	-562121.9	562121.9
_cons	.2985626	.8477591	0.35	0.725	-1.3798	1.976925

Billings, MO

Linear regression

Number of obs	= 154
F(31, 122)	= 1808.46
Prob > F	= 0.0000
R-squared	= 0.9987
Root MSE	= .00201

ndvi_billi~o	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0019432	.0010638	-1.83	0.070	-.0040492	.0001628
year_1984	-.0025031	.0014764	-1.70	0.093	-.0054258	.0004196
year_1985	-.0020005	.0008891	-2.25	0.026	-.0037606	-.0002403
year_1986	-.0014116	.0012702	-1.11	0.269	-.0039262	.001103
year_1987	-.0007264	.0009949	-0.73	0.467	-.0026959	.0012431
year_1988	-.0022191	.0012378	-1.79	0.075	-.0046694	.0002312
year_1989	-.0008131	.0008957	-0.91	0.366	-.0025862	.0009599
year_1990	-.0011713	.0014568	-0.80	0.423	-.0040552	.0017127
year_1991	-.0014836	.0011489	-1.29	0.199	-.0037579	.0007907
year_1992	-.0012675	.0008469	-1.50	0.137	-.002944	.000409
year_1993	-.0025893	.0013696	-1.89	0.061	-.0053005	.0001219
year_1994	-.0003844	.0005572	-0.69	0.492	-.0014875	.0007188
year_1995	-.0011664	.0009834	-1.19	0.238	-.003113	.0007803
year_1996	-.0007567	.0007264	-1.04	0.300	-.0021947	.0006814
year_1997	-.0003687	.0007357	-0.50	0.617	-.001825	.0010877
year_1998	-.0006112	.0005892	-1.04	0.302	-.0017776	.0005553
year_1999	-.000318	.000933	-0.34	0.734	-.002165	.001529
year_2000	-.0010512	.0009069	-1.16	0.249	-.0028465	.000744
year_2001	-.0002649	.0007119	-0.37	0.710	-.0016741	.0011443
year_2002	-.0017647	.0009611	-1.84	0.069	-.0036673	.0001379
year_2003	.0001853	.0005506	0.34	0.737	-.0009047	.0012752
may1631	-.0012335	.0007642	-1.61	0.109	-.0027463	.0002794
jun115	-.0003436	.0005839	-0.59	0.557	-.0014995	.0008123
jun1630	-.0003972	.0006293	-0.63	0.529	-.0016429	.0008484
jul115	-.0006114	.0005617	-1.09	0.279	-.0017233	.0005005
jul1631	-.0005066	.0006725	-0.75	0.453	-.0018378	.0008246
aug115	-.0005125	.000634	-0.81	0.420	-.0017676	.0007427
cp_billing~o	-.0000454	.0001313	-0.35	0.730	-.0003054	.0002146
gdd_billin~o	-.0000636	.0263038	-0.00	0.998	-.0521346	.0520073
cp2_billin~o	.7172349	.0047265	151.75	0.000	.7078783	.7265916
gdd2_billi~o	.0000447	.0052677	0.01	0.993	-.0103833	.0104727
cpgdd_bill~o	(dropped)					
_cons	.348479	.0024416	142.73	0.000	.3436456	.3533124

Whatley, AL

Linear regression		Number of obs =	154
		F(32, 121) =	1074.08
		Prob > F =	0.0000
		R-squared =	0.9960
		Root MSE =	.00364

ndvi_whatl~l	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0045009	.0043951	-1.02	0.308	-.0132021	.0042003
year_1984	-.0013929	.0019453	-0.72	0.475	-.0052442	.0024583
year_1985	-.0027174	.0025095	-1.08	0.281	-.0076856	.0022508
year_1986	.0014459	.0017035	0.85	0.398	-.0019267	.0048185
year_1987	.0004471	.0018343	0.24	0.808	-.0031843	.0040785
year_1988	-.0024634	.0028168	-0.87	0.384	-.0080399	.0031132
year_1989	-.0004438	.0016743	-0.27	0.791	-.0037586	.0028709
year_1990	-.0014201	.0018396	-0.77	0.442	-.005062	.0022218
year_1991	-.0005895	.0021331	-0.28	0.783	-.0048126	.0036336
year_1992	.0003683	.0013551	0.27	0.786	-.0023145	.0030511
year_1993	-.0009189	.0013692	-0.67	0.503	-.0036295	.0017917
year_1994	.0005559	.001426	0.39	0.697	-.0022672	.0033791
year_1995	-.0014367	.0014291	-1.01	0.317	-.0042659	.0013925
year_1996	-.0009747	.0018334	-0.53	0.596	-.0046043	.002655
year_1997	-.0004654	.0015507	-0.30	0.765	-.0035355	.0026047
year_1998	.000234	.0012811	0.18	0.855	-.0023023	.0027703
year_1999	.0009066	.0014281	0.63	0.527	-.0019208	.0037339
year_2000	.0000539	.0011806	0.05	0.964	-.0022834	.0023912
year_2001	-.0006779	.0018172	-0.37	0.710	-.0042755	.0029197
year_2002	-.0006464	.0014549	-0.44	0.658	-.0035267	.0022339
year_2003	.0004835	.0010169	0.48	0.635	-.0015297	.0024967
may1631	-.0015639	.00113	-1.38	0.169	-.003801	.0006733
jun115	.0005477	.0011138	0.49	0.624	-.0016574	.0027529
jun1630	-.0008722	.0011576	-0.75	0.453	-.003164	.0014196
jul115	.0010431	.0013097	0.80	0.427	-.0015498	.0036361
jul1631	.0017734	.0015862	1.12	0.266	-.0013668	.0049136
aug115	.0013923	.0016429	0.85	0.398	-.0018602	.0046447
cp_whatleyal	.0001589	.0001073	1.48	0.141	-.0000536	.0003714
gdd_whatle~l	.0002879	.000419	0.69	0.493	-.0005415	.0011174
cp2_whatle~l	.6925994	.0230501	30.05	0.000	.6469656	.7382332
gdd2_whatl~l	-7.15e-11	2.99e-07	-0.00	1.000	-5.92e-07	5.92e-07
cpgdd_what~l	-.000375	.0005285	-0.71	0.479	-.0014212	.0006712
_cons	.3578705	.0138615	25.82	0.000	.330428	.3853129

Geneva, AL

Linear regression

Number of obs	= 154
F(32, 121)	= 4.21
Prob > F	= 0.0000
R-squared	= 0.4072
Root MSE	= .03865

ndvi_geneva	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0168221	.0244037	0.69	0.492	-.0314914	.0651357
year_1984	.0552678	.0286398	1.93	0.056	-.0014323	.1119678
year_1985	.0320217	.0221221	1.45	0.150	-.0117748	.0758182
year_1986	-.0136262	.0327487	-0.42	0.678	-.0784609	.0512084
year_1987	.0480268	.0262717	1.83	0.070	-.0039849	.1000385
year_1988	.0037405	.0400368	0.09	0.926	-.0755228	.0830039
year_1989	.0319786	.0236434	1.35	0.179	-.0148297	.0787868
year_1990	.0679395	.0242506	2.80	0.006	.0199291	.1159499
year_1991	.0221802	.0257313	0.86	0.390	-.0287618	.0731222
year_1992	.0181951	.0278175	0.65	0.514	-.036877	.0732671
year_1993	.0600016	.028043	2.14	0.034	.0044831	.1155201
year_1994	-.0193104	.0291236	-0.66	0.509	-.0769681	.0383474
year_1995	.0788524	.024731	3.19	0.002	.0298908	.1278139
year_1996	.0663852	.0234738	2.83	0.005	.0199126	.1128579
year_1997	.0422652	.0245504	1.72	0.088	-.0063388	.0908692
year_1998	.0315957	.0231037	1.37	0.174	-.0141441	.0773355
year_1999	.0379132	.0293952	1.29	0.200	-.0202823	.0961087
year_2000	.0062709	.0263491	0.24	0.812	-.045894	.0584359
year_2001	.0111018	.0232526	0.48	0.634	-.0349329	.0571366
year_2002	.0529343	.023113	2.29	0.024	.007176	.0986926
year_2003	.0364944	.0223548	1.63	0.105	-.0077627	.0807516
may1631	-.005704	.0114569	-0.50	0.619	-.028386	.0169781
jun115	-.0028594	.0107121	-0.27	0.790	-.0240669	.0183481
jun1630	-.0182569	.0154903	-1.18	0.241	-.0489241	.0124103
jul115	-.0121542	.0111584	-1.09	0.278	-.0342451	.0099368
jul1631	-.009523	.0125356	-0.76	0.449	-.0343405	.0152945
aug115	.0065086	.0125719	0.52	0.606	-.0183808	.031398
cp_genevaal	.0036268	.0039313	0.92	0.358	-.0041562	.0114098
gdd_genevaal	.0002806	.0020007	0.14	0.889	-.0036803	.0042415
cp2_genevaal	-.0004919	.0003321	-1.48	0.141	-.0011494	.0001656
gdd2_genev~l	-3.36e-06	.0000257	-0.13	0.896	-.0000542	.0000475
cpgdd_gene~l	.0000558	.0003646	0.15	0.879	-.000666	.0007776
_cons	.6250433	.0214508	29.14	0.000	.5825758	.6675108

Tyloertown, MS

Linear regression

Number of obs	= 154
F(32, 121)	= 1.79
Prob > F	= 0.0131
R-squared	= 0.3707
Root MSE	= .04872

ndvi_tyler~n	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0581781	.0362154	-1.61	0.111	-.1298759	.0135198
year_1984	.02653	.0220191	1.20	0.231	-.0170625	.0701225
year_1985	.0268781	.0251193	1.07	0.287	-.0228521	.0766083
year_1986	.0113201	.0224217	0.50	0.615	-.0330696	.0557098
year_1987	-.0354673	.0509053	-0.70	0.487	-.1362477	.0653132
year_1988	.0170466	.0193292	0.88	0.380	-.0212206	.0553139
year_1989	-.0193976	.0251847	-0.77	0.443	-.0692574	.0304622
year_1990	.0509098	.0267369	1.90	0.059	-.002023	.1038426
year_1991	.0202735	.021953	0.92	0.358	-.0231883	.0637354
year_1992	.005863	.0262942	0.22	0.824	-.0461932	.0579193
year_1993	.0091782	.0210911	0.44	0.664	-.0325772	.0509336
year_1994	-.040543	.0263546	-1.54	0.127	-.0927189	.011633
year_1995	.0298729	.0286992	1.04	0.300	-.0269447	.0866905
year_1996	.007442	.0299839	0.25	0.804	-.051919	.066803
year_1997	.0188691	.02045	0.92	0.358	-.0216171	.0593553
year_1998	-.0454386	.0307655	-1.48	0.142	-.106347	.0154698
year_1999	-.032689	.0375603	-0.87	0.386	-.1070496	.0416716
year_2000	-.0284778	.0266589	-1.07	0.288	-.0812561	.0243005
year_2001	.0051957	.0366074	0.14	0.887	-.0672784	.0776697
year_2002	-.0075366	.0380494	-0.20	0.843	-.0828655	.0677923
year_2003	.0048576	.0337951	0.14	0.886	-.0620488	.071764
may1631	.0001395	.0152273	0.01	0.993	-.0300069	.0302858
jun115	-.0273185	.0202696	-1.35	0.180	-.0674476	.0128106
jun1630	-.0395705	.0218987	-1.81	0.073	-.0829246	.0037837
jul115	-.027146	.0220633	-1.23	0.221	-.070826	.0165341
jul1631	-.029297	.0223106	-1.31	0.192	-.0734668	.0148727
aug115	-.0542908	.0238138	-2.28	0.024	-.1014364	-.0071451
cp_tylerto~s	.0027387	.0088322	0.31	0.757	-.0147469	.0202243
gdd_tylert~s	.0002123	.0006359	0.33	0.739	-.0010467	.0014714
cp2_tylert~s	-.0004498	.0008281	-0.54	0.588	-.0020893	.0011897
gdd2_tyler~s	-2.43e-08	3.13e-06	-0.01	0.994	-6.22e-06	6.18e-06
cpgdd_tyle~s	-.0000382	.0000742	-0.51	0.608	-.0001851	.0001088
_cons	.7281435	.0289442	25.16	0.000	.6708407	.7854462

Watervalley, MS

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Linear regression                                      Number of obs =     154
                                                       F( 30,   123) =    1.53
                                                       Prob > F      =  0.0549
                                                       R-squared     =  0.2435
                                                       Root MSE      =  .04925

------------------------------------------------------------------------------
             |             Robust HC3
ndvi_water~y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |  -.0407341   .0176278    -2.31   0.023    -.0756272   -.0058409
   year_1984 |  -.0016127   .0233541    -0.07   0.945    -.0478407    .0446153
   year_1985 |  -.0026036    .025339    -0.10   0.918    -.0527607    .0475535
   year_1986 |  -.0318293   .0223056    -1.43   0.156    -.0759819    .0123233
   year_1987 |   .0097512   .0235225     0.41   0.679    -.0368101    .0563124
   year_1988 |   -.007001   .0317402    -0.22   0.826    -.0698287    .0558267
   year_1989 |  -.0225714   .0211763    -1.07   0.289    -.0644886    .0193459
   year_1990 |   -.014873   .0192565    -0.77   0.441    -.0529901    .0232441
   year_1991 |   -.004424   .0221165    -0.20   0.842    -.0482022    .0393542
   year_1992 |  -.0009264   .0237348    -0.04   0.969     -.047908    .0460552
   year_1993 |   .0011051   .0223518     0.05   0.961    -.0431389    .0453492
   year_1994 |   .0113409   .0206971     0.55   0.585    -.0296278    .0523095
   year_1995 |  -.0022643   .0238139    -0.10   0.924    -.0494025    .0448739
   year_1996 |   .0186871   .0223299     0.84   0.404    -.0255135    .0628877
   year_1997 |   .0160506   .0233264     0.69   0.493    -.0301225    .0622238
   year_1998 |   .0387544   .0212002     1.83   0.070    -.0032101    .0807188
   year_1999 |  -.0545856   .0298318    -1.83   0.070    -.1136359    .0044647
   year_2000 |  -.0059226   .0233239    -0.25   0.800    -.0520909    .0402456
   year_2001 |  -.0268454   .0329803    -0.81   0.417     -.092128    .0384371
   year_2002 |  -.0291613   .0313492    -0.93   0.354     -.091215    .0328925
   year_2003 |   .0059127   .0252744     0.23   0.815    -.0441164    .0559418
     may1631 |   .0197332   .0166396     1.19   0.238    -.0132038    .0526702
      jun115 |   .0408046   .0169469     2.41   0.018     .0072593    .0743499
     jun1630 |   .0318378   .0164458     1.94   0.055    -.0007156    .0643912
      jul115 |   .0286193   .0155563     1.84   0.068    -.0021735    .0594121
     jul1631 |   .0113255   .0159025     0.71   0.478    -.0201525    .0428034
      aug115 |   .0110193   .0160517     0.69   0.494     -.020754    .0427927
cp_waterva~s |  -.0049316   .0063898    -0.77   0.442    -.0175797    .0077166
gdd_waterv~s |  -.0370331   .1677312    -0.22   0.826    -.3690467    .2949806
cp2_waterv~s |   .0001781   .0007825     0.23   0.820    -.0013708     .001727
gdd2_water~s |  (dropped)
cpgdd_wate~s |  (dropped)
       _cons |   .6852792   .0189837    36.10   0.000     .6477021    .7228563
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Booneville, MS

Linear regression

Number of obs	=	154
F(29, 123)	=	.
Prob > F	=	.
R-squared	=	0.2516
Root MSE	=	.06671

ndvi_boone~e	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0176272	.0288466	0.61	0.542	-.0394728	.0747272
year_1984	-.0219299	.0332775	-0.66	0.511	-.0878007	.0439409
year_1985	-.0115745	.0425277	-0.27	0.786	-.0957553	.0726064
year_1986	-.0431993	.0396819	-1.09	0.278	-.1217472	.0353485
year_1987	.0267861	.0240629	1.11	0.268	-.0208448	.0744171
year_1988	-.0486672	.0501828	-0.97	0.334	-.1480009	.0506665
year_1989	-.0637051	.0236603	-2.69	0.008	-.1105393	-.0168709
year_1990	-.0041193	.0246117	-0.17	0.867	-.0528368	.0445981
year_1991	-.0414676	.0241906	-1.71	0.089	-.0893514	.0064162
year_1992	.0366734	.0290355	1.26	0.209	-.0208007	.0941475
year_1993	.0352452	.0281077	1.25	0.212	-.0203923	.0908828
year_1994	-.015201	.033347	-0.46	0.649	-.0812093	.0508072
year_1995	-.0007134	.0251597	-0.03	0.977	-.0505154	.0490886
year_1996	-.002436	.0273371	-0.09	0.929	-.0565482	.0516761
year_1997	-.0299676	.0509933	-0.59	0.558	-.1309057	.0709705
year_1998	.0534192	.0338571	1.58	0.117	-.0135988	.1204372
year_1999	-.0050156	.0375046	-0.13	0.894	-.0792536	.0692223
year_2000	.0149919	.0231675	0.65	0.519	-.0308668	.0608507
year_2001	.0043448	.0319428	0.14	0.892	-.058884	.0675735
year_2002	.0464683	.0347074	1.34	0.183	-.0222329	.1151696
year_2003	.0353024	.0287542	1.23	0.222	-.0216147	.0922196
may1631	-.0120872	.0229309	-0.53	0.599	-.0574774	.0333031
jun115	-.0005179	.0216314	-0.02	0.981	-.043336	.0423002
jun1630	.0086567	.0218421	0.40	0.693	-.0345783	.0518917
jul115	.0153753	.0215496	0.71	0.477	-.0272808	.0580315
jul1631	.0153449	.0188631	0.81	0.418	-.0219935	.0526832
aug115	.0368662	.0189202	1.95	0.054	-.0005852	.0743177
cp_boonevi~s	-.0078334	.0073256	-1.07	0.287	-.022334	.0066671
gdd_boonev~s	(dropped)					
cp2_boonev~s	.0007474	.0007503	1.00	0.321	-.0007378	.0022327
gdd2_boone~s	-.0117444	.0038046	-3.09	0.002	-.0192753	-.0042134
cpgdd_boon~s	(dropped)					
_cons	.6702623	.0236138	28.38	0.000	.6235202	.7170043

Angelica, NY

Linear regression		
Number of obs	=	147
F(32, 114)	=	12.23
Prob > F	=	0.0000
R-squared	=	0.6782
Root MSE	=	.06439

ndvi_angel~y	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0283738	.0481552	-0.59	0.557	-.1237689	.0670212
year_1984	.0081673	.0291335	0.28	0.780	-.0495459	.0658805
year_1985	.0641509	.0319778	2.01	0.047	.0008031	.1274987
year_1986	-.0114171	.0532736	-0.21	0.831	-.1169518	.0941176
year_1987	.0901469	.0291259	3.10	0.002	.0324486	.1478451
year_1988	.0367367	.0335771	1.09	0.276	-.0297792	.1032526
year_1989	-.0041931	.0478049	-0.09	0.930	-.0988942	.0905081
year_1990	-.0021799	.0326676	-0.07	0.947	-.0668942	.0625345
year_1991	.061097	.0306541	1.99	0.049	.0003715	.1218226
year_1992	.0138988	.0374164	0.37	0.711	-.0602229	.0880204
year_1993	.0402421	.0410566	0.98	0.329	-.0410908	.121575
year_1994	.029428	.0336716	0.87	0.384	-.0372752	.0961312
year_1995	.0346229	.0412579	0.84	0.403	-.0471087	.1163545
year_1996	.011258	.0408926	0.28	0.784	-.0697499	.0922659
year_1997	.0805086	.0528843	1.52	0.131	-.0242548	.185272
year_1998	.0304986	.0358385	0.85	0.397	-.0404972	.1014944
year_1999	-.1151762	.0687459	-1.68	0.097	-.2513613	.0210089
year_2000	.0122428	.0420215	0.29	0.771	-.0710016	.0954871
year_2001	.0405299	.0333724	1.21	0.227	-.0255806	.1066404
year_2002	.022705	.0309884	0.73	0.465	-.0386828	.0840928
year_2003	-.0402226	.0392238	-1.03	0.307	-.1179246	.0374795
may1631	.1194912	.0191495	6.24	0.000	.0815563	.1574261
jun115	.1781642	.0257993	6.91	0.000	.1270559	.2292724
jun1630	.1995968	.0207513	9.62	0.000	.1584886	.240705
jul115	.2048994	.0203338	10.08	0.000	.1646182	.2451805
jul1631	.2053064	.0254659	8.06	0.000	.1548586	.2557542
aug115	.1875534	.0213777	8.77	0.000	.1452043	.2299026
cp_angelic~y	-.0214638	.013715	-1.56	0.120	-.0486331	.0057054
gdd_angeli~y	-.0059557	.0149817	-0.40	0.692	-.0356344	.023723
cp2_angeli~y	.0034728	.0021568	1.61	0.110	-.0007999	.0077455
gdd2_angel~y	.0002725	.0008616	0.32	0.752	-.0014344	.0019794
cpgdd_ange~y	.0051141	.0042287	1.21	0.229	-.003263	.0134911
_cons	.6012895	.0335662	17.91	0.000	.5347951	.667784

Riverhead, NY

```
Linear regression                                      Number of obs =     153
                                                       F( 32,   120) =    6.66
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4179
                                                       Root MSE      =  .05856

------------------------------------------------------------------------------
             |             Robust HC3
ndvi_river~y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |   .0416971   .0471456     0.88   0.378     -.051648    .1350421
   year_1984 |   -.020925   .0304148    -0.69   0.493    -.0811442    .0392942
   year_1985 |   -.054676   .0297978    -1.83   0.069    -.1136736    .0043215
   year_1986 |  -.0553459   .0294918    -1.88   0.063    -.1137375    .0030458
   year_1987 |  -.0619271   .0277143    -2.23   0.027    -.1167996   -.0070547
   year_1988 |  -.0563372   .0286758    -1.96   0.052    -.1131132    .0004388
   year_1989 |  -.0433322   .0316512    -1.37   0.174    -.1059994    .0193351
   year_1990 |  -.0315593   .0897602    -0.35   0.726    -.2092783    .1461596
   year_1991 |  -.0504409   .0289853    -1.74   0.084    -.1078298     .006948
   year_1992 |    -.00971   .0466531    -0.21   0.835      -.10208    .0826599
   year_1993 |  -.0481086   .0283864    -1.69   0.093    -.1043117    .0080945
   year_1994 |  -.0662178   .0291813    -2.27   0.025    -.1239948   -.0084408
   year_1995 |  -.0560783    .029241    -1.92   0.058    -.1139736    .0018169
   year_1996 |   -.039141   .0286568    -1.37   0.175    -.0958795    .0175976
   year_1997 |  -.0416685   .0279285    -1.49   0.138     -.096965    .0136279
   year_1998 |  -.0339818   .0286608    -1.19   0.238    -.0907281    .0227646
   year_1999 |  -.0406091   .0282846    -1.44   0.154    -.0966106    .0153923
   year_2000 |  -.0608872   .0297703    -2.05   0.043    -.1198303   -.0019441
   year_2001 |  -.0239945   .0314857    -0.76   0.448    -.0863341    .0383451
   year_2002 |  -.0071209   .0346145    -0.21   0.837    -.0756551    .0614134
   year_2003 |  -.0434661   .0332109    -1.31   0.193    -.1092213    .0222892
     may1631 |   .0236187   .0172444     1.37   0.173     -.010524    .0577614
      jun115 |   .0347223   .0234769     1.48   0.142    -.0117604     .081205
     jun1630 |   .0028936   .0211363     0.14   0.891    -.0389548    .0447419
      jul115 |   .0633983   .0246468     2.57   0.011     .0145994    .1121973
     jul1631 |   .0995204   .0232477     4.28   0.000     .0534917    .1455492
      aug115 |   .0754067   .0172465     4.37   0.000     .0412599    .1095535
cp_riverhe~y |   .0005499   .0103395     0.05   0.958    -.0199216    .0210214
gdd_riverh~y |    .000076   .0008351     0.09   0.928    -.0015774    .0017294
cp2_riverh~y |  -.0008595   .0008545    -1.01   0.316    -.0025513    .0008323
gdd2_river~y |  -2.92e-07   7.03e-06    -0.04   0.967    -.0000142    .0000136
cpgdd_rive~y |  -3.38e-06   .0001283    -0.03   0.979    -.0002574    .0002506
       _cons |   .2337028   .0289396     8.08   0.000     .1764044    .2910012
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Dixon Springs, IL

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Linear regression                                      Number of obs =     154
                                                       F( 32,   121) =    2.73
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.3850
                                                       Root MSE      =   .0511
```

ndvi_dixon~l	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0271273	.0260684	-1.04	0.300	-.0787366	.0244821
year_1984	-.0050628	.0250265	-0.20	0.840	-.0546093	.0444837
year_1985	.0189454	.0280572	0.68	0.501	-.0366013	.0744921
year_1986	-.0426464	.0256717	-1.66	0.099	-.0934703	.0081775
year_1987	.0021229	.0165704	0.13	0.898	-.0306826	.0349283
year_1988	-.0370846	.0326293	-1.14	0.258	-.1016828	.0275137
year_1989	-.0235597	.0193192	-1.22	0.225	-.0618071	.0146877
year_1990	-.0122354	.0328022	-0.37	0.710	-.077176	.0527051
year_1991	-.0506332	.021018	-2.41	0.018	-.0922439	-.0090225
year_1992	-.0719529	.0290269	-2.48	0.015	-.1294192	-.0144865
year_1993	.001795	.0218586	0.08	0.935	-.0414799	.0450699
year_1994	-.0084006	.0305541	-0.27	0.784	-.0688904	.0520893
year_1995	-.0238949	.0192098	-1.24	0.216	-.0619257	.014136
year_1996	-.047496	.0258983	-1.83	0.069	-.0987685	.0037765
year_1997	-.0363165	.0189991	-1.91	0.058	-.0739301	.0012972
year_1998	-.0173899	.017725	-0.98	0.329	-.0524813	.0177015
year_1999	-.0841162	.0381953	-2.20	0.030	-.1597339	-.0084984
year_2000	-.0456207	.0184752	-2.47	0.015	-.0821973	-.009044
year_2001	-.0514956	.0270189	-1.91	0.059	-.1049867	.0019954
year_2002	-.0700223	.0399773	-1.75	0.082	-.1491679	.0091234
year_2003	-.0509445	.0207575	-2.45	0.016	-.0920396	-.0098495
may1631	.0203427	.0210306	0.97	0.335	-.021293	.0619783
jun115	.0490718	.0188481	2.60	0.010	.0117571	.0863866
jun1630	.0617864	.0218323	2.83	0.005	.0185636	.1050092
jul115	.0343052	.025966	1.32	0.189	-.0171015	.0857118
jul1631	.0160639	.028707	0.56	0.577	-.0407692	.072897
aug115	.0166231	.0236139	0.70	0.483	-.0301269	.0633731
cp_dixonsp~l	-.0247274	.0149805	-1.65	0.101	-.0543853	.0049306
gdd_dixons~l	.0001348	.0006875	0.20	0.845	-.0012264	.0014959
cp2_dixons~l	.0023076	.0015415	1.50	0.137	-.0007442	.0053594
gdd2_dixon~l	-1.36e-06	3.33e-06	-0.41	0.683	-7.96e-06	5.23e-06
cpgdd_dixo~l	.0000739	.0001263	0.59	0.559	-.0001761	.000324
_cons	.7767418	.0306565	25.34	0.000	.7160492	.8374343

Cooperstown, NY

Linear regression

Number of obs	= 152
F(32, 119)	= 9.14
Prob > F	= 0.0000
R-squared	= 0.7375
Root MSE	= .05264

ndvi_coope~y	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0261502	.0628468	-0.42	0.678	-.150593	.0982927
year_1984	-.0273081	.0402466	-0.68	0.499	-.1070004	.0523843
year_1985	-.0007546	.0412589	-0.02	0.985	-.0824513	.0809421
year_1986	-.0133495	.0468885	-0.28	0.776	-.1061933	.0794944
year_1987	.0526468	.0375965	1.40	0.164	-.0217981	.1270917
year_1988	-.0730128	.0467429	-1.56	0.121	-.1655685	.0195428
year_1989	-.0068823	.0413784	-0.17	0.868	-.0888157	.0750512
year_1990	.0275128	.0390083	0.71	0.482	-.0497277	.1047532
year_1991	.0358906	.0408731	0.88	0.382	-.0450423	.1168235
year_1992	.0155663	.0377681	0.41	0.681	-.0592184	.0903509
year_1993	-.002513	.0430087	-0.06	0.954	-.0876744	.0826484
year_1994	-.0455109	.0428122	-1.06	0.290	-.1302833	.0392615
year_1995	.0109622	.0414536	0.26	0.792	-.07112	.0930443
year_1996	.0016894	.0410118	0.04	0.967	-.079518	.0828968
year_1997	.0091859	.0423236	0.22	0.829	-.074619	.0929908
year_1998	-.0150007	.0493353	-0.30	0.762	-.1126896	.0826882
year_1999	-.0612155	.0465244	-1.32	0.191	-.1533385	.0309076
year_2000	-.0229831	.0396455	-0.58	0.563	-.1014851	.0555189
year_2001	-.0003435	.0388129	-0.01	0.993	-.0771968	.0765099
year_2002	-.0241873	.0400325	-0.60	0.547	-.1034556	.055081
year_2003	-.0259923	.0381602	-0.68	0.497	-.1015534	.0495688
may1631	.1086838	.0218349	4.98	0.000	.0654485	.1519191
jun115	.1820393	.0187081	9.73	0.000	.1449954	.2190832
jun1630	.2126047	.0195842	10.86	0.000	.1738261	.2513834
jul115	.2114519	.019498	10.84	0.000	.172844	.2500599
jul1631	.2029356	.0207677	9.77	0.000	.1618135	.2440578
aug115	.19877	.0221483	8.97	0.000	.1549142	.2426258
cp_coopers~y	-.0156301	.0165597	-0.94	0.347	-.0484199	.0171597
gdd_cooper~y	-.0036227	.0070859	-0.51	0.610	-.0176535	.010408
cp2_cooper~y	.0026359	.0031953	0.82	0.411	-.0036912	.008963
gdd2_coope~y	.00013	.0003102	0.42	0.676	-.0004843	.0007442
cpgdd_coop~y	.0008839	.0020455	0.43	0.666	-.0031664	.0049341
_cons	.6405323	.0421319	15.20	0.000	.5571069	.7239577

Fredonia, NY

Linear regression

Number of obs	= 150
F(32, 117)	= 5.31
Prob > F	= 0.0000
R-squared	= 0.4680
Root MSE	= .13475

ndvi_fredo~y	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.2327651	.0655209	3.55	0.001	.1030043	.3625258
year_1984	-.0675862	.0589121	-1.15	0.254	-.1842584	.0490861
year_1985	.0421883	.086927	0.49	0.628	-.1299661	.2143426
year_1986	.0620425	.0935701	0.66	0.509	-.1232682	.2473531
year_1987	.0972161	.1161419	0.84	0.404	-.1327969	.3272292
year_1988	.0296327	.1196946	0.25	0.805	-.2074163	.2666816
year_1989	-.0965262	.0529252	-1.82	0.071	-.2013418	.0082893
year_1990	.2298279	.096938	2.37	0.019	.0378472	.4218086
year_1991	.1488724	.076411	1.95	0.054	-.0024556	.3002004
year_1992	-.0557951	.0597568	-0.93	0.352	-.1741404	.0625502
year_1993	-.0659511	.0658079	-1.00	0.318	-.1962801	.0643779
year_1994	-.0581795	.0644554	-0.90	0.369	-.18583	.0694709
year_1995	.2286902	.0725724	3.15	0.002	.0849644	.372416
year_1996	.0935393	.087786	1.07	0.289	-.0803162	.2673948
year_1997	.2181918	.0705528	3.09	0.002	.0784657	.3579179
year_1998	.0696453	.0861659	0.81	0.421	-.1010018	.2402923
year_1999	.1012545	.0980691	1.03	0.304	-.0929662	.2954752
year_2000	-.0427883	.0575581	-0.74	0.459	-.1567791	.0712024
year_2001	.0926657	.0488017	1.90	0.060	-.0039836	.1893149
year_2002	.0925211	.0558124	1.66	0.100	-.0180125	.2030547
year_2003	.0588423	.0486616	1.21	0.229	-.0375295	.1552142
may1631	.0635006	.0407635	1.56	0.122	-.0172294	.1442306
jun115	.1138036	.0452602	2.51	0.013	.0241683	.203439
jun1630	.1170005	.0499729	2.34	0.021	.0180318	.2159692
jul115	.0848134	.0464877	1.82	0.071	-.0072532	.1768799
jul1631	.1165217	.0539467	2.16	0.033	.0096831	.2233602
aug115	.1514606	.0415745	3.64	0.000	.0691243	.2337968
cp_fredoni~y	.0036334	.036792	0.10	0.922	-.0692313	.0764981
gdd_fredon~y	-.0025888	.0042545	-0.61	0.544	-.0110145	.0058369
cp2_fredon~y	-.0037338	.0076721	-0.49	0.627	-.0189281	.0114604
gdd2_fredo~y	.0000173	.0000853	0.20	0.840	-.0001516	.0001862
cpgdd_fred~y	.0007017	.0012981	0.54	0.590	-.0018691	.0032725
_cons	.2131806	.0639232	3.33	0.001	.0865841	.3397771

DuQuoin, IL

Linear regression

Number of obs =	152
F(32, 119) =	3.06
Prob > F =	0.0000
R-squared =	0.4759
Root MSE =	.06219

ndvi_duquo~l	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0715632	.0301413	-2.37	0.019	-.131246	-.0118805
year_1984	-.0123733	.0351284	-0.35	0.725	-.081931	.0571844
year_1985	-.0467007	.0364259	-1.28	0.202	-.1188276	.0254261
year_1986	-.0825284	.0505133	-1.63	0.105	-.1825498	.0174931
year_1987	-.0151675	.030946	-0.49	0.625	-.0764436	.0461086
year_1988	-.0578558	.0436535	-1.33	0.188	-.1442942	.0285826
year_1989	-.0518532	.0302361	-1.71	0.089	-.1117237	.0080174
year_1990	-.0293687	.0292072	-1.01	0.317	-.0872019	.0284645
year_1991	.0070318	.0310087	0.23	0.821	-.0543684	.0684321
year_1992	-.0497954	.0329006	-1.51	0.133	-.1149418	.015351
year_1993	.0096508	.0277434	0.35	0.729	-.045284	.0645855
year_1994	.0456559	.0360946	1.26	0.208	-.025815	.1171268
year_1995	-.0620663	.029541	-2.10	0.038	-.1205604	-.0035721
year_1996	-.0457834	.0367818	-1.24	0.216	-.1186151	.0270482
year_1997	-.0208775	.0280698	-0.74	0.458	-.0764585	.0347036
year_1998	-.0494999	.035866	-1.38	0.170	-.1205182	.0215184
year_1999	-.0730326	.0554995	-1.32	0.191	-.1829273	.036862
year_2000	-.0163926	.0323894	-0.51	0.614	-.0805268	.0477415
year_2001	.0369799	.052815	0.70	0.485	-.067599	.1415588
year_2002	-.1073475	.0363553	-2.95	0.004	-.1793347	-.0353603
year_2003	-.0833309	.0304973	-2.73	0.007	-.1437185	-.0229432
may1631	.0021801	.0250778	0.09	0.931	-.0474764	.0518367
jun115	.0267184	.0204057	1.31	0.193	-.0136868	.0671237
jun1630	.0283487	.024868	1.14	0.257	-.0208923	.0775898
jul115	.0450466	.0272282	1.65	0.101	-.0088679	.0989612
jul1631	.066614	.0223626	2.98	0.004	.0223337	.1108943
aug115	.0966548	.0239181	4.04	0.000	.0492945	.1440151
cp_duquoinil	-.003905	.0106682	-0.37	0.715	-.0250292	.0172191
gdd_duquoi~l	.0030754	.0043228	0.71	0.478	-.0054842	.0116349
cp2_duquoi~l	.0006234	.0010111	0.62	0.539	-.0013787	.0026256
gdd2_duquo~l	-.0001246	.0001258	-0.99	0.324	-.0003737	.0001245
cpgdd_duqu~l	.0003616	.0011602	0.31	0.756	-.0019357	.0026588
_cons	.6569405	.0347298	18.92	0.000	.588172	.725709

Minonk, IL

Linear regression

Number of obs	=	154
F(32, 121)	=	42.21
Prob > F	=	0.0000
R-squared	=	0.8804
Root MSE	=	.08085

ndvi_minon~l	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0481888	.0447709	1.08	0.284	-.0404471	.1368247
year_1984	.0922199	.0429529	2.15	0.034	.0071834	.1772564
year_1985	.0119913	.0521421	0.23	0.819	-.0912377	.1152204
year_1986	.1167071	.0473162	2.47	0.015	.0230322	.2103819
year_1987	.1414166	.064887	2.18	0.031	.0129557	.2698775
year_1988	.03183	.0550482	0.58	0.564	-.0771523	.1408124
year_1989	.0146755	.0510324	0.29	0.774	-.0863567	.1157077
year_1990	.0107141	.0462373	0.23	0.817	-.0808249	.1022531
year_1991	.0900767	.0526151	1.71	0.089	-.0140888	.1942423
year_1992	.0439921	.0585647	0.75	0.454	-.0719522	.1599365
year_1993	.1098077	.0385648	2.85	0.005	.0334584	.1861569
year_1994	.114623	.038932	2.94	0.004	.0375468	.1916993
year_1995	-.0468025	.0737909	-0.63	0.527	-.192891	.0992861
year_1996	.0212617	.0515383	0.41	0.681	-.0807719	.1232953
year_1997	.0730018	.039306	1.86	0.066	-.0048148	.1508184
year_1998	.0320344	.0442703	0.72	0.471	-.0556103	.1196791
year_1999	.0092114	.0470031	0.20	0.845	-.0838435	.1022664
year_2000	.0490382	.0526729	0.93	0.354	-.0552416	.1533181
year_2001	.0514822	.0491554	1.05	0.297	-.0458339	.1487983
year_2002	-.014293	.0478542	-0.30	0.766	-.109033	.0804471
year_2003	-.0073834	.0466717	-0.16	0.875	-.0997823	.0850154
may1631	.0461896	.0216479	2.13	0.035	.0033319	.0890474
jun115	.163816	.0219158	7.47	0.000	.120428	.2072041
jun1630	.2993712	.0253612	11.80	0.000	.2491621	.3495804
jul115	.4384863	.0227429	19.28	0.000	.3934607	.4835118
jul1631	.4785873	.0305599	15.66	0.000	.418086	.5390886
aug115	.4710056	.0268054	17.57	0.000	.4179372	.5240741
cp_minonkil	-.0035669	.0193004	-0.18	0.854	-.041777	.0346433
gdd_minonkil	-.0550987	.0975211	-0.56	0.573	-.2481675	.1379701
cp2_minonkil	.0004504	.003925	0.11	0.909	-.0073202	.008221
gdd2_minon~l	.0098144	.0350977	0.28	0.780	-.0596707	.0792995
cpgdd_mino~l	.0066651	.054316	0.12	0.903	-.1008678	.114198
_cons	.2900124	.0439497	6.60	0.000	.2030023	.3770224

Ardmore, SD

Linear regression

Number of obs =	154
F(32, 121) =	7.23
Prob > F =	0.0000
R-squared =	0.6931
Root MSE =	.07427

ndvi_ardmo~d	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0474251	.0507304	0.93	0.352	-.0530091	.1478592
year_1984	.0555745	.0484905	1.15	0.254	-.0404253	.1515743
year_1985	-.1493896	.0450467	-3.32	0.001	-.2385714	-.0602078
year_1986	.0262037	.037659	0.70	0.488	-.0483523	.1007597
year_1987	-.0158939	.0489111	-0.32	0.746	-.1127263	.0809386
year_1988	-.0775526	.040946	-1.89	0.061	-.1586159	.0035108
year_1989	-.1992094	.0551606	-3.61	0.000	-.3084143	-.0900045
year_1990	-.084743	.0367785	-2.30	0.023	-.1575558	-.0119302
year_1991	.0304762	.041676	0.73	0.466	-.0520324	.1129849
year_1992	-.0482084	.0495442	-0.97	0.332	-.1462941	.0498773
year_1993	.0864502	.0418444	2.07	0.041	.0036082	.1692922
year_1994	-.0208586	.0357225	-0.58	0.560	-.0915808	.0498636
year_1995	.029145	.0432149	0.67	0.501	-.0564102	.1147002
year_1996	-.0390643	.0368469	-1.06	0.291	-.1120126	.0338839
year_1997	-.0400871	.0392234	-1.02	0.309	-.1177402	.0375661
year_1998	-.0504032	.0476944	-1.06	0.293	-.1448269	.0440204
year_1999	.0389671	.0474788	0.82	0.413	-.0550298	.132964
year_2000	-.0186798	.0486165	-0.38	0.701	-.114929	.0775693
year_2001	.0603024	.0414972	1.45	0.149	-.0218522	.142457
year_2002	-.0852921	.0473224	-1.80	0.074	-.1789794	.0083951
year_2003	.0394685	.0539818	0.73	0.466	-.0674028	.1463398
may1631	.0950105	.0253219	3.75	0.000	.044879	.145142
jun115	.1584467	.0247595	6.40	0.000	.1094288	.2074646
jun1630	.1565548	.0247249	6.33	0.000	.1076054	.2055042
jul115	.1172997	.0287907	4.07	0.000	.0603009	.1742984
jul1631	.0920791	.0291283	3.16	0.002	.034412	.1497463
aug115	.0223606	.0325038	0.69	0.493	-.0419892	.0867104
cp_ardmoresd	-.0243216	.0149466	-1.63	0.106	-.0539123	.005269
gdd_ardmor~d	-.0037858	.0025508	-1.48	0.140	-.0088359	.0012643
cp2_ardmor~d	.0033668	.0029678	1.13	0.259	-.0025087	.0092423
gdd2_ardmo~d	.0000266	.0000488	0.55	0.586	-.00007	.0001233
cpgdd_ardm~d	.0000814	.0007241	0.11	0.911	-.0013521	.0015149
_cons	.4557017	.0375284	12.14	0.000	.3814043	.529999

Aledo, IL

Linear regression

Number of obs	= 147
F(32, 114)	= 19.33
Prob > F	= 0.0000
R-squared	= 0.8066
Root MSE	= .06254

ndvi_aledoil	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.040315	.0329944	1.22	0.224	-.0250466	.1056766
year_1984	.0413763	.0389859	1.06	0.291	-.0358545	.1186071
year_1985	.0098081	.0320682	0.31	0.760	-.0537186	.0733349
year_1986	.0666633	.0444902	1.50	0.137	-.0214714	.154798
year_1987	.0719674	.0480215	1.50	0.137	-.0231628	.1670976
year_1988	.0802089	.0357808	2.24	0.027	.0093273	.1510905
year_1989	.0538909	.0473162	1.14	0.257	-.0398421	.1476238
year_1990	-.0445709	.0229706	-1.94	0.055	-.0900755	.0009337
year_1991	.0551381	.0356181	1.55	0.124	-.0154211	.1256973
year_1992	.0111847	.0257153	0.43	0.664	-.0397571	.0621264
year_1993	-.0022843	.0256541	-0.09	0.929	-.0531048	.0485362
year_1994	.0508357	.029263	1.74	0.085	-.007134	.1088054
year_1995	-.0384342	.0458349	-0.84	0.403	-.1292327	.0523643
year_1996	-.0457417	.0357311	-1.28	0.203	-.1165248	.0250413
year_1997	.0036798	.0301852	0.12	0.903	-.0561168	.0634765
year_1998	-.017658	.0337322	-0.52	0.602	-.0844813	.0491653
year_1999	-.0566496	.0598262	-0.95	0.346	-.1751648	.0618655
year_2000	.0010919	.0242738	0.04	0.964	-.0469944	.0491782
year_2001	.0166393	.0309446	0.54	0.592	-.0446617	.0779403
year_2002	.0143897	.0278177	0.52	0.606	-.0407169	.0694963
year_2003	-.0226475	.0345032	-0.66	0.513	-.090998	.045703
may1631	.0558081	.0193472	2.88	0.005	.0174814	.0941347
jun115	.1328544	.0155225	8.56	0.000	.1021045	.1636043
jun1630	.2007011	.0203845	9.85	0.000	.1603195	.2410827
jul115	.2774454	.0197493	14.05	0.000	.2383223	.3165685
jul1631	.3154938	.0230649	13.68	0.000	.2698023	.3611852
aug115	.3081037	.0226207	13.62	0.000	.2632923	.3529152
cp_aledoil	.0032036	.0108706	0.29	0.769	-.018331	.0247381
gdd_aledoil	-.0005093	.0007324	-0.70	0.488	-.0019602	.0009416
cp2_aledoil	-.0007615	.0012479	-0.61	0.543	-.0032336	.0017106
gdd2_aledoil	-3.82e-06	4.58e-06	-0.83	0.406	-.0000129	5.25e-06
cpgdd_aled~l	-6.57e-06	.0001365	-0.05	0.962	-.0002769	.0002638
_cons	.4669736	.027856	16.76	0.000	.411791	.5221561

Morrisonville, IL

Linear regression

Number of obs	= 154
F(32, 121)	= 33.55
Prob > F	= 0.0000
R-squared	= 0.8947
Root MSE	= .07398

ndvi_morri~l	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0811253	.0506382	-1.60	0.112	-.181377	.0191264
year_1984	.0429293	.0461077	0.93	0.354	-.0483531	.1342117
year_1985	.0143696	.0357423	0.40	0.688	-.0563917	.085131
year_1986	.0495223	.0496923	1.00	0.321	-.0488567	.1479014
year_1987	.01906	.0489011	0.39	0.697	-.0777526	.1158726
year_1988	.0137417	.0415844	0.33	0.742	-.0685856	.096069
year_1989	.0229432	.0510319	0.45	0.654	-.078088	.1239744
year_1990	-.0330794	.0363546	-0.91	0.365	-.105053	.0388942
year_1991	.024442	.0427706	0.57	0.569	-.0602338	.1091177
year_1992	-.0042098	.0402397	-0.10	0.917	-.0838748	.0754552
year_1993	-.0091369	.0420075	-0.22	0.828	-.0923019	.0740281
year_1994	.0517123	.0360045	1.44	0.154	-.0195682	.1229927
year_1995	-.0906695	.0590581	-1.54	0.127	-.2075906	.0262516
year_1996	-.0052172	.041094	-0.13	0.899	-.0865735	.0761392
year_1997	-.010958	.0437351	-0.25	0.803	-.0975431	.0756271
year_1998	-.0479726	.0394084	-1.22	0.226	-.1259919	.0300467
year_1999	-.0286223	.0443692	-0.65	0.520	-.1164629	.0592183
year_2000	.0313374	.0456973	0.69	0.494	-.0591323	.1218072
year_2001	.0333922	.0365964	0.91	0.363	-.0390601	.1058444
year_2002	-.0603881	.0467445	-1.29	0.199	-.1529312	.0321549
year_2003	-.0301362	.0496677	-0.61	0.545	-.1284665	.0681941
may1631	.0595839	.0247821	2.40	0.018	.0105212	.1086466
jun115	.1605598	.0245791	6.53	0.000	.1118989	.2092206
jun1630	.2803748	.0287707	9.75	0.000	.2234157	.337334
jul115	.4232788	.0247154	17.13	0.000	.3743481	.4722094
jul1631	.4832877	.0226614	21.33	0.000	.4384235	.5281519
aug115	.4806842	.0233544	20.58	0.000	.434448	.5269204
cp_morriso~l	-.0011769	.0118374	-0.10	0.921	-.0246122	.0222584
gdd_morris~l	-.0357936	.0355391	-1.01	0.316	-.1061527	.0345654
cp2_morris~l	.000217	.0017368	0.12	0.901	-.0032215	.0036554
gdd2_morri~l	.004254	.0042252	1.01	0.316	-.004111	.0126189
cpgdd_morr~l	.0128155	.0103021	1.24	0.216	-.0075803	.0332113
_cons	.3696421	.0398862	9.27	0.000	.2906767	.4486074

Windsor, IL

Linear regression

Number of obs =	152
F(32, 119) =	23.57
Prob > F =	0.0000
R-squared =	0.8429
Root MSE =	.07294

ndvi_winds~l	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0133347	.0326037	-0.41	0.683	-.0778934	.051224
year_1984	-.0278832	.0498616	-0.56	0.577	-.1266142	.0708479
year_1985	.1015616	.0306196	3.32	0.001	.0409318	.1621914
year_1986	.0653765	.0497819	1.31	0.192	-.0331967	.1639496
year_1987	.0672948	.0327846	2.05	0.042	.0023781	.1322115
year_1988	.0003337	.0578562	0.01	0.995	-.1142273	.1148946
year_1989	-.0562159	.042935	-1.31	0.193	-.1412315	.0287997
year_1990	-.0123381	.0288918	-0.43	0.670	-.0695467	.0448705
year_1991	.0403691	.0354267	1.14	0.257	-.0297792	.1105174
year_1992	.076587	.0288837	2.65	0.009	.0193944	.1337797
year_1993	.0704206	.0331111	2.13	0.036	.0048573	.135984
year_1994	.0666185	.0266063	2.50	0.014	.0139354	.1193016
year_1995	.0240091	.0378707	0.63	0.527	-.0509787	.0989969
year_1996	-.0487952	.0293252	-1.66	0.099	-.106862	.0092715
year_1997	.0477792	.0345926	1.38	0.170	-.0207177	.116276
year_1998	-.0405767	.0418804	-0.97	0.335	-.1235041	.0423507
year_1999	-.0368495	.0596437	-0.62	0.538	-.15495	.0812509
year_2000	.0778095	.032192	2.42	0.017	.0140661	.1415529
year_2001	.0596248	.0412822	1.44	0.151	-.0221181	.1413677
year_2002	-.0538251	.0553631	-0.97	0.333	-.1634496	.0557994
year_2003	.023911	.0527589	0.45	0.651	-.0805568	.1283788
may1631	.0685738	.0282825	2.42	0.017	.0125715	.1245761
jun115	.1484165	.0256191	5.79	0.000	.097688	.1991449
jun1630	.2278831	.0297652	7.66	0.000	.168945	.2868212
jul115	.3176406	.0293382	10.83	0.000	.2595481	.3757331
jul1631	.3730634	.0296399	12.59	0.000	.3143735	.4317533
aug115	.3737261	.0266637	14.02	0.000	.3209292	.4265229
cp_windsoril	.0011287	.015059	0.07	0.940	-.0286896	.030947
gdd_windso~l	-.0001142	.0010117	-0.11	0.910	-.0021175	.0018891
cp2_windso~l	-.0004187	.0020536	-0.20	0.839	-.0044849	.0036476
gdd2_winds~l	3.55e-06	7.41e-06	0.48	0.633	-.0000111	.0000182
cpgdd_wind~l	-.0000677	.000192	-0.35	0.725	-.0004479	.0003125
_cons	.4027587	.0342261	11.77	0.000	.3349875	.4705298

Whitehall, IL

Linear regression

Number of obs	=	154
F(32, 121)	=	16.17
Prob > F	=	0.0000
R-squared	=	0.8223
Root MSE	=	.05041

ndvi_white~l	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0223346	.0335438	0.67	0.507	-.0440743	.0887434
year_1984	-.0406866	.0389768	-1.04	0.299	-.1178513	.0364782
year_1985	-.0312302	.0295607	-1.06	0.293	-.0897535	.0272931
year_1986	.0058827	.0391893	0.15	0.881	-.0717028	.0834682
year_1987	-.0144346	.0269859	-0.53	0.594	-.0678603	.0389911
year_1988	-.0349025	.0303447	-1.15	0.252	-.0949778	.0251728
year_1989	-.0844149	.0327922	-2.57	0.011	-.1493357	-.0194942
year_1990	-.0352763	.0308899	-1.14	0.256	-.096431	.0258783
year_1991	-.0261203	.0271642	-0.96	0.338	-.0798989	.0276583
year_1992	-.0811632	.0323956	-2.51	0.014	-.1452989	-.0170276
year_1993	.021119	.0388194	0.54	0.587	-.0557342	.0979722
year_1994	-.0237974	.0294549	-0.81	0.421	-.0821111	.0345163
year_1995	-.0878394	.0409082	-2.15	0.034	-.1688279	-.0068508
year_1996	-.0170933	.0317738	-0.54	0.592	-.079998	.0458114
year_1997	-.044292	.0281482	-1.57	0.118	-.1000187	.0114348
year_1998	-.0545219	.0338591	-1.61	0.110	-.121555	.0125111
year_1999	-.0901575	.0445167	-2.03	0.045	-.17829	-.0020251
year_2000	-.0183657	.0321085	-0.57	0.568	-.0819329	.0452016
year_2001	-.0503882	.0281932	-1.79	0.076	-.106204	.0054277
year_2002	-.0929357	.0291355	-3.19	0.002	-.1506171	-.0352543
year_2003	-.0287054	.0276783	-1.04	0.302	-.0835019	.026091
may1631	.04801	.0192532	2.49	0.014	.0098932	.0861269
jun115	.085768	.0182012	4.71	0.000	.049734	.121802
jun1630	.1496914	.0175059	8.55	0.000	.1150338	.184349
jul115	.2200903	.0180048	12.22	0.000	.184445	.2557355
jul1631	.2444999	.0190758	12.82	0.000	.2067342	.2822655
aug115	.2522601	.0177123	14.24	0.000	.217194	.2873262
cp_whiteha~l	-.0182543	.0117523	-1.55	0.123	-.0415211	.0050124
gdd_whiteh~l	-.001681	.0013968	-1.20	0.231	-.0044463	.0010844
cp2_whiteh~l	.0034162	.0021873	1.56	0.121	-.0009141	.0077466
gdd2_white~l	4.35e-06	8.25e-06	0.53	0.599	-.000012	.0000207
cpgdd_whit~l	.0004228	.0004887	0.87	0.389	-.0005447	.0013904
_cons	.573954	.028187	20.36	0.000	.5181505	.6297576

Beaverdam, KY

Linear regression

Number of obs	= 154
F(32, 121)	= 1.85
Prob > F	= 0.0092
R-squared	= 0.3194
Root MSE	= .06148

ndvi_beave~y	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0118609	.0297693	-0.40	0.691	-.070797	.0470752
year_1984	.0038685	.0277082	0.14	0.889	-.0509872	.0587242
year_1985	-.004731	.0401411	-0.12	0.906	-.084201	.074739
year_1986	-.0181012	.0449297	-0.40	0.688	-.1070514	.070849
year_1987	.0065834	.0363066	0.18	0.856	-.0652951	.0784619
year_1988	-.0276831	.0345024	-0.80	0.424	-.0959898	.0406235
year_1989	.0424528	.0268849	1.58	0.117	-.010773	.0956786
year_1990	.0284982	.0329006	0.87	0.388	-.0366373	.0936337
year_1991	-.0027505	.0285681	-0.10	0.923	-.0593085	.0538076
year_1992	.0125325	.034507	0.36	0.717	-.0557832	.0808483
year_1993	.0453328	.0294578	1.54	0.126	-.0129868	.1036524
year_1994	.0329448	.0292241	1.13	0.262	-.0249119	.0908015
year_1995	-.0130507	.0273294	-0.48	0.634	-.0671565	.0410552
year_1996	-.0005167	.03135	-0.02	0.987	-.0625823	.0615488
year_1997	-.0542115	.0373412	-1.45	0.149	-.1281383	.0197153
year_1998	.0351133	.0262696	1.34	0.184	-.0168944	.087121
year_1999	-.0651472	.0695365	-0.94	0.351	-.202813	.0725186
year_2000	.0287427	.0243712	1.18	0.241	-.0195065	.0769918
year_2001	-.0107115	.0374518	-0.29	0.775	-.0848571	.0634342
year_2002	.0157513	.0423629	0.37	0.711	-.0681172	.0996199
year_2003	-.0145583	.0320414	-0.45	0.650	-.0779928	.0488761
may1631	.0074414	.0234967	0.32	0.752	-.0390765	.0539594
jun115	.0165654	.0234309	0.71	0.481	-.0298223	.062953
jun1630	.0458894	.0253981	1.81	0.073	-.0043929	.0961717
jul115	.0581596	.0323198	1.80	0.074	-.005826	.1221452
jul1631	.0604035	.025803	2.34	0.021	.0093197	.1114874
aug115	.0572195	.0242455	2.36	0.020	.0092191	.1052199
cp_beaverd~y	-.0064646	.0177389	-0.36	0.716	-.0415834	.0286542
gdd_beaver~y	-.0004401	.0007742	-0.57	0.571	-.0019727	.0010926
cp2_beaver~y	.0000682	.0022253	0.03	0.976	-.0043373	.0044737
gdd2_beave~y	2.44e-06	4.68e-06	0.52	0.603	-6.83e-06	.0000117
cpgdd_beav~y	.0000672	.0001512	0.44	0.658	-.0002321	.0003664
_cons	.6336632	.0355898	17.80	0.000	.5632038	.7041225

Providence, KY

Linear regression

Number of obs	= 152
F(32, 119)	= 4.36
Prob > F	= 0.0000
R-squared	= 0.4770
Root MSE	= .05054

ndvi_provi~y	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0355821	.0246205	-1.45	0.151	-.0843331	.0131689
year_1984	-.0685089	.0224074	-3.06	0.003	-.1128778	-.02414
year_1985	-.0511872	.0213744	-2.39	0.018	-.0935106	-.0088638
year_1986	-.0352316	.0379043	-0.93	0.355	-.1102859	.0398228
year_1987	.0115914	.0276409	0.42	0.676	-.0431404	.0663231
year_1988	-.0119616	.0304438	-0.39	0.695	-.0722432	.0483201
year_1989	-.056194	.0201797	-2.78	0.006	-.0961519	-.0162361
year_1990	-.0104509	.0238966	-0.44	0.663	-.0577686	.0368668
year_1991	-.0252115	.0233096	-1.08	0.282	-.0713669	.0209438
year_1992	-.0339439	.0252002	-1.35	0.181	-.0838428	.0159549
year_1993	-.0040339	.0238378	-0.17	0.866	-.0512352	.0431673
year_1994	.0155524	.0211186	0.74	0.463	-.0262644	.0573693
year_1995	-.0190936	.0280305	-0.68	0.497	-.0745968	.0364097
year_1996	-.0234261	.0225682	-1.04	0.301	-.0681135	.0212612
year_1997	-.0357593	.0306236	-1.17	0.245	-.096397	.0248785
year_1998	-.0049703	.0248385	-0.20	0.842	-.054153	.0442125
year_1999	-.0505224	.0357144	-1.41	0.160	-.1212405	.0201956
year_2000	.0123247	.0278548	0.44	0.659	-.0428306	.0674799
year_2001	-.0236032	.0366831	-0.64	0.521	-.0962394	.049033
year_2002	-.014949	.0517256	-0.29	0.773	-.1173709	.0874728
year_2003	-.0215267	.0301102	-0.71	0.476	-.0811478	.0380945
may1631	.0331683	.0195738	1.69	0.093	-.0055898	.0719264
jun115	.0584579	.0168899	3.46	0.001	.0250143	.0919015
jun1630	.0723926	.0196543	3.68	0.000	.0334752	.1113101
jul115	.0968744	.0229735	4.22	0.000	.0513845	.1423643
jul1631	.0939209	.0279004	3.37	0.001	.0386754	.1491665
aug115	.1087523	.0194447	5.59	0.000	.0702498	.1472548
cp_provide~y	-.0043347	.0126924	-0.34	0.733	-.029467	.0207976
gdd_provid~y	-.000445	.000372	-1.20	0.234	-.0011816	.0002916
cp2_provid~y	.0004866	.0018536	0.26	0.793	-.0031837	.004157
gdd2_provi~y	1.27e-06	1.81e-06	0.70	0.484	-2.32e-06	4.86e-06
cpgdd_prov~y	.0001099	.0000833	1.32	0.189	-.000055	.0002748
_cons	.6452699	.0275488	23.42	0.000	.5907205	.6998193

Scottsville, KY

Linear regression

Number of obs =	154
F(32, 121) =	1.70
Prob > F =	0.0211
R-squared =	0.2918
Root MSE =	.05517

ndvi_scott~y	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0104786	.0267665	-0.39	0.696	-.0634699	.0425126
year_1984	.0126503	.0240673	0.53	0.600	-.0349972	.0602978
year_1985	-.0294144	.0239934	-1.23	0.223	-.0769157	.0180869
year_1986	.0062355	.042864	0.15	0.885	-.0786251	.091096
year_1987	.0329745	.0238171	1.38	0.169	-.0141776	.0801267
year_1988	-.0568934	.0366856	-1.55	0.124	-.1295221	.0157354
year_1989	-.0173505	.0239443	-0.72	0.470	-.0647545	.0300535
year_1990	.0210701	.0230661	0.91	0.363	-.0245953	.0667354
year_1991	.0103841	.0251802	0.41	0.681	-.0394668	.060235
year_1992	.0259999	.0246768	1.05	0.294	-.0228544	.0748542
year_1993	.061082	.0244326	2.50	0.014	.0127111	.1094529
year_1994	.016381	.0273819	0.60	0.551	-.0378288	.0705907
year_1995	.0173408	.0235254	0.74	0.462	-.029234	.0639156
year_1996	.0391999	.0271739	1.44	0.152	-.0145979	.0929977
year_1997	-.049908	.0519731	-0.96	0.339	-.1528025	.0529866
year_1998	.0440536	.0226205	1.95	0.054	-.0007298	.0888369
year_1999	-.044615	.0294842	-1.51	0.133	-.1029868	.0137568
year_2000	-.0019378	.0229541	-0.08	0.933	-.0473815	.0435058
year_2001	-.0304171	.0282685	-1.08	0.284	-.086382	.0255479
year_2002	-.0130972	.0406202	-0.32	0.748	-.0935157	.0673212
year_2003	-.0014389	.0266493	-0.05	0.957	-.0541983	.0513205
may1631	.0008634	.0202134	0.04	0.966	-.0391544	.0408813
jun115	.0121209	.0261908	0.46	0.644	-.0397307	.0639725
jun1630	.0124641	.0198473	0.63	0.531	-.0268289	.051757
jul115	-.0015421	.0243684	-0.06	0.950	-.0497857	.0467016
jul1631	-.0069472	.0221181	-0.31	0.754	-.0507357	.0368414
aug115	-.0077483	.0230069	-0.34	0.737	-.0532966	.0378
cp_scottsv~y	-.0169576	.0111439	-1.52	0.131	-.0390199	.0051047
gdd_scotts~y	.0000891	.0008371	0.11	0.915	-.0015681	.0017463
cp2_scotts~y	.0021163	.0014794	1.43	0.155	-.0008126	.0050452
gdd2_scott~y	-1.05e-06	6.50e-06	-0.16	0.872	-.0000139	.0000118
cpgdd_scot~y	-.0000128	.0001295	-0.10	0.922	-.000269	.0002435
_cons	.7405423	.0274051	27.02	0.000	.6862866	.7947981

Farmville, VA

```
Linear regression                                      Number of obs =     154
                                                       F( 32,   121) =    2.18
                                                       Prob > F      =  0.0013
                                                       R-squared     =  0.2818
                                                       Root MSE      =  .05002

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             |             Robust HC3
ndvi_farmv~a |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |  -.0072645   .0336235    -0.22   0.829    -.0738309     .059302
   year_1984 |  -.0237011   .0284176    -0.83   0.406    -.0799611     .032559
   year_1985 |   .0190816   .0264131     0.72   0.471    -.0332101    .0713733
   year_1986 |  -.0528567   .0366788    -1.44   0.152    -.1254721    .0197586
   year_1987 |  -.0640799   .0294799    -2.17   0.032    -.1224431   -.0057168
   year_1988 |   .0045946   .0268448     0.17   0.864    -.0485518     .057741
   year_1989 |  -.0072792   .0314316    -0.23   0.817    -.0695063    .0549478
   year_1990 |  -.0115152   .0358936    -0.32   0.749    -.0825761    .0595456
   year_1991 |   .0048707   .0314733     0.15   0.877     -.057439    .0671804
   year_1992 |  -.0020645   .0325448    -0.06   0.950    -.0664956    .0623666
   year_1993 |  -.0396591    .026318    -1.51   0.134    -.0917626    .0124443
   year_1994 |  -.0048698   .0257201    -0.19   0.850    -.0557895      .04605
   year_1995 |   -.025707   .0449763    -0.57   0.569    -.1147495    .0633355
   year_1996 |   .0571876   .0266907     2.14   0.034     .0043462    .1100289
   year_1997 |   .0156052    .026884     0.58   0.563    -.0376188    .0688292
   year_1998 |   .0189363   .0275089     0.69   0.493    -.0355247    .0733973
   year_1999 |  -.0461295   .0285558    -1.62   0.109    -.1026632    .0104042
   year_2000 |  -.0355375   .0333357    -1.07   0.289    -.1015343    .0304592
   year_2001 |  -.0011939   .0329124    -0.04   0.971    -.0663527     .063965
   year_2002 |   .0112215   .0278006     0.40   0.687    -.0438171    .0662601
   year_2003 |  -.0258688   .0310858    -0.83   0.407    -.0874114    .0356737
     may1631 |   .0168171   .0145039     1.16   0.249    -.0118972    .0455314
      jun115 |   .0101518   .0146879     0.69   0.491    -.0189267    .0392304
     jun1630 |  -.0082997    .020464    -0.41   0.686    -.0488135    .0322142
      jul115 |   .0098607   .0142093     0.69   0.489    -.0182704    .0379918
     jul1631 |  -.0117791   .0160646    -0.73   0.465    -.0435833     .020025
      aug115 |  -.0143991   .0143369    -1.00   0.317    -.0427828    .0139847
cp_farmvil~a |  -.0093549   .0111658    -0.84   0.404    -.0314605    .0127508
gdd_farmvi~a |   .0002666    .000882     0.30   0.763    -.0014795    .0020127
cp2_farmvi~a |   .0013016   .0021463     0.61   0.545    -.0029475    .0055508
gdd2_farmv~a |  -1.22e-06   5.58e-06    -0.22   0.827    -.0000123    9.82e-06
cpgdd_farm~a |   .0000436   .0001482     0.29   0.769    -.0002499    .0003371
       _cons |   .7553327   .0269563    28.02   0.000     .7019656    .8086999
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Halfway, OR

Linear regression

Number of obs	= 154
F(32, 121)	= 5.75
Prob > F	= 0.0000
R-squared	= 0.6129
Root MSE	= .05843

ndvi_halfw~r	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0045855	.0273861	-0.17	0.867	-.0588036	.0496326
year_1984	-.1118311	.0512977	-2.18	0.031	-.2133885	-.0102737
year_1985	-.0475247	.0280116	-1.70	0.092	-.1029811	.0079317
year_1986	-.0363448	.0317056	-1.15	0.254	-.0991144	.0264247
year_1987	-.0942497	.0322533	-2.92	0.004	-.1581036	-.0303957
year_1988	-.0572674	.0281454	-2.03	0.044	-.1129886	-.0015463
year_1989	-.1667029	.0581581	-2.87	0.005	-.2818422	-.0515637
year_1990	.0204923	.033272	0.62	0.539	-.0453785	.0863631
year_1991	.0048531	.0293357	0.17	0.869	-.0532247	.0629308
year_1992	-.0216448	.0268389	-0.81	0.422	-.0747795	.0314898
year_1993	.0366908	.0333568	1.10	0.274	-.0293478	.1027294
year_1994	-.0127621	.0363253	-0.35	0.726	-.0846776	.0591535
year_1995	-.0055507	.0248292	-0.22	0.823	-.0547067	.0436052
year_1996	-.0209193	.0300682	-0.70	0.488	-.0804472	.0386086
year_1997	.0294366	.0259497	1.13	0.259	-.0219376	.0808108
year_1998	.0238996	.0267826	0.89	0.374	-.0291237	.0769228
year_1999	-.1262148	.0546211	-2.31	0.023	-.2343518	-.0180779
year_2000	-.0332195	.0309595	-1.07	0.285	-.0945121	.0280731
year_2001	-.0312373	.0360201	-0.87	0.388	-.1025486	.0400741
year_2002	-.056997	.0319156	-1.79	0.077	-.1201824	.0061883
year_2003	-.0370086	.0407022	-0.91	0.365	-.1175894	.0435722
may1631	.0546615	.0236037	2.32	0.022	.0079317	.1013914
jun115	.1014561	.0222314	4.56	0.000	.0574431	.1454691
jun1630	.121641	.0239723	5.07	0.000	.0741815	.1691004
jul115	.1248396	.0258856	4.82	0.000	.0735921	.176087
jul1631	.103763	.0273066	3.80	0.000	.0497025	.1578236
aug115	.0622505	.0294709	2.11	0.037	.003905	.120596
cp_halfwayor	-.0116825	.0383896	-0.30	0.761	-.0876849	.0643199
gdd_halfwa~r	.0000197	.0005368	0.04	0.971	-.0010432	.0010825
cp2_halfwa~r	.002884	.016586	0.17	0.862	-.0299523	.0357203
gdd2_halfw~r	-2.56e-06	2.42e-06	-1.06	0.293	-7.36e-06	2.24e-06
cpgdd_half~r	.0002786	.0005807	0.48	0.632	-.000871	.0014282
_cons	.6256836	.0323239	19.36	0.000	.56169	.6896773

Heppner, OR

Linear regression

Number of obs =	154
F(32, 121) =	17.49
Prob > F =	0.0000
R-squared =	0.8128
Root MSE =	.02952

ndvi_heppn~r	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0104216	.0108217	0.96	0.337	-.0110029	.0318461
year_1984	.0730094	.015741	4.64	0.000	.0418459	.1041728
year_1985	-.0109806	.0146801	-0.75	0.456	-.0400437	.0180826
year_1986	.0023427	.0116159	0.20	0.841	-.0206541	.0253395
year_1987	.0150334	.0224459	0.67	0.504	-.0294041	.0594709
year_1988	.0337379	.0158461	2.13	0.035	.0023664	.0651094
year_1989	.0037682	.0127102	0.30	0.767	-.0213949	.0289314
year_1990	-.0299778	.0131029	-2.29	0.024	-.0559184	-.0040371
year_1991	-.0035282	.012817	-0.28	0.784	-.0289028	.0218465
year_1992	-.0173372	.0149962	-1.16	0.250	-.0470262	.0123517
year_1993	.0538795	.0103431	5.21	0.000	.0334025	.0743565
year_1994	-.0144165	.014936	-0.97	0.336	-.0439863	.0151534
year_1995	.0475247	.0123802	3.84	0.000	.0230148	.0720347
year_1996	.0199534	.0088575	2.25	0.026	.0024176	.0374892
year_1997	.0158352	.0181152	0.87	0.384	-.0200286	.0516991
year_1998	.005315	.0144582	0.37	0.714	-.0233088	.0339389
year_1999	-.0943604	.0267755	-3.52	0.001	-.1473696	-.0413512
year_2000	.0171573	.0173318	0.99	0.324	-.0171556	.0514701
year_2001	.0041758	.0150813	0.28	0.782	-.0256817	.0340333
year_2002	-.0568254	.013156	-4.32	0.000	-.0828711	-.0307797
year_2003	-.0029935	.0153802	-0.19	0.846	-.0334427	.0274557
may1631	.0045386	.0102699	0.44	0.659	-.0157933	.0248705
jun115	-.0186404	.010515	-1.77	0.079	-.0394577	.0021768
jun1630	-.0367275	.0110949	-3.31	0.001	-.0586928	-.0147622
jul115	-.07193	.0104631	-6.87	0.000	-.0926446	-.0512155
jul1631	-.1005427	.0105175	-9.56	0.000	-.1213649	-.0797205
aug115	-.127	.0101061	-12.57	0.000	-.1470077	-.1069923
cp_heppneror	-.0002919	.0156138	-0.02	0.985	-.0312036	.0306197
gdd_heppne~r	.0010318	.001987	0.52	0.605	-.0029019	.0049656
cp2_heppne~r	-.0078946	.0064562	-1.22	0.224	-.0206764	.0048872
gdd2_heppn~r	-.0000477	.000089	-0.54	0.593	-.0002239	.0001284
cpgdd_hepp~r	-.0051527	.0054849	-0.94	0.349	-.0160114	.0057061
_cons	.386386	.0122575	31.52	0.000	.362119	.4106529

Vernonia, OR

```
Linear regression                                      Number of obs =     154
                                                       F( 29,   124) =    5.72
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.6213
                                                       Root MSE      =  .04315

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             |             Robust HC3
ndvi_verno~r |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |   .0012868   .0223519     0.06   0.954    -.0429539    .0455276
   year_1984 |   .0193084   .0272858     0.71   0.480    -.0346979    .0733147
   year_1985 |  -.0037914   .0137172    -0.28   0.783    -.0309416    .0233589
   year_1986 |  -.0462867   .0220618    -2.10   0.038    -.0899532   -.0026201
   year_1987 |  -.0085904   .0169038    -0.51   0.612    -.0420478     .024867
   year_1988 |   .0041859   .0129849     0.32   0.748    -.0215148    .0298866
   year_1989 |   .0245919   .0116997     2.10   0.038     .0014349     .047749
   year_1990 |  -.0092312    .014589    -0.63   0.528     -.038107    .0196445
   year_1991 |  -.0358473   .0157438    -2.28   0.025    -.0670087   -.0046858
   year_1992 |  -.0092113   .0141861    -0.65   0.517    -.0372895    .0188668
   year_1993 |   .0350784   .0229814     1.53   0.129    -.0104082     .080565
   year_1994 |  -.0047755   .0248134    -0.19   0.848    -.0538881    .0443372
   year_1995 |  -.0029645    .012271    -0.24   0.810    -.0272523    .0213233
   year_1996 |    .003398   .0174869     0.19   0.846    -.0312134    .0380094
   year_1997 |   .0465179   .0166976     2.79   0.006     .0134687    .0795672
   year_1998 |  -.0124099   .0150768    -0.82   0.412    -.0422511    .0174314
   year_1999 |  -.1170521   .0567742    -2.06   0.041    -.2294241   -.0046801
   year_2000 |   -.002864   .0145068    -0.20   0.844     -.031577    .0258491
   year_2001 |   -.032492   .0143423    -2.27   0.025    -.0608794   -.0041047
   year_2002 |    .003871   .0133022     0.29   0.772    -.0224577    .0301997
   year_2003 |  -.0262239   .0194679    -1.35   0.180    -.0647563    .0123084
     may1631 |   .0462553   .0159315     2.90   0.004     .0147224    .0777882
      jun115 |   .0587845   .0146515     4.01   0.000     .0297851     .087784
     jun1630 |   .0697777   .0191124     3.65   0.000     .0319489    .1076066
      jul115 |   .0762828   .0170133     4.48   0.000     .0426087    .1099568
     jul1631 |   .0832142   .0158694     5.24   0.000     .0518041    .1146243
      aug115 |   .0770531   .0141614     5.44   0.000     .0490237    .1050825
cp_vernoni~r |  -.0652368   .0158303    -4.12   0.000    -.0965694   -.0339041
gdd_vernon~r |  (dropped)
cp2_vernon~r |   .0182706   .0064432     2.84   0.005     .0055176    .0310235
gdd2_verno~r |  (dropped)
cpgdd_vern~r |  (dropped)
       _cons |   .7348687   .0158199    46.45   0.000     .7035567    .7661808
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Forks, WA

Linear regression

Number of obs	= 154
F(32, 121)	= 6.22
Prob > F	= 0.0000
R-squared	= 0.5993
Root MSE	= .05867

ndvi_forkswa	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0060116	.0267616	0.22	0.823	-.04697	.0589932
year_1984	.0074518	.0235332	0.32	0.752	-.0391383	.054042
year_1985	.0344618	.0151639	2.27	0.025	.0044408	.0644828
year_1986	.0149436	.0181736	0.82	0.413	-.0210358	.0509231
year_1987	.037665	.0176966	2.13	0.035	.00263	.0727
year_1988	.0292729	.0169949	1.72	0.088	-.004373	.0629188
year_1989	-.005	.0133734	-0.37	0.709	-.0314761	.0214761
year_1990	.0124962	.0234983	0.53	0.596	-.0340249	.0590173
year_1991	-.0379361	.0560899	-0.68	0.500	-.1489808	.0731086
year_1992	.0130545	.0173993	0.75	0.455	-.021392	.047501
year_1993	.009134	.0410418	0.22	0.824	-.072119	.090387
year_1994	.0426475	.0195099	2.19	0.031	.0040226	.0812725
year_1995	-.0021399	.0173761	-0.12	0.902	-.0365404	.0322606
year_1996	-.008113	.0185604	-0.44	0.663	-.0448582	.0286322
year_1997	-.0364267	.0424329	-0.86	0.392	-.1204337	.0475804
year_1998	.0318406	.0178147	1.79	0.076	-.0034284	.0671095
year_1999	-.1516868	.0491609	-3.09	0.003	-.2490138	-.0543597
year_2000	.007253	.0175152	0.41	0.680	-.0274229	.0419289
year_2001	-.0193826	.0189798	-1.02	0.309	-.0569581	.0181929
year_2002	-.0509337	.0402967	-1.26	0.209	-.1307116	.0288443
year_2003	-.0476575	.0304495	-1.57	0.120	-.1079404	.0126253
may1631	.0237826	.0226944	1.05	0.297	-.021147	.0687122
jun115	.0521723	.0176589	2.95	0.004	.0172119	.0871326
jun1630	.0422529	.0225308	1.88	0.063	-.0023528	.0868585
jul115	.1013079	.0162424	6.24	0.000	.0691518	.1334639
jul1631	.0970547	.0172559	5.62	0.000	.0628921	.1312172
aug115	.0818146	.0168627	4.85	0.000	.0484305	.1151987
cp_forkswa	-.0060689	.0119968	-0.51	0.614	-.0298197	.0176818
gdd_forkswa	.0037493	.0019267	1.95	0.054	-.0000651	.0075637
cp2_forkswa	-.0012039	.001723	-0.70	0.486	-.004615	.0022073
gdd2_forkswa	-.0001173	.0000558	-2.10	0.038	-.0002278	-6.80e-06
cpgdd_fork~a	.000813	.0006455	1.26	0.210	-.0004649	.0020909
_cons	.7110297	.0216565	32.83	0.000	.6681549	.7539044

Batesville Livestock, AK

Linear regression

Number of obs	= 154
F(32, 121)	= 3.42
Prob > F	= 0.0000
R-squared	= 0.3823
Root MSE	= .04451

ndvi_bates~k	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0114399	.0214599	0.53	0.595	-.0310457	.0539255
year_1984	.0240602	.0257169	0.94	0.351	-.0268532	.0749736
year_1985	.0273521	.0195054	1.40	0.163	-.011264	.0659682
year_1986	-.0294981	.0294025	-1.00	0.318	-.0877081	.028712
year_1987	-.0139426	.0285173	-0.49	0.626	-.0704002	.042515
year_1988	.0113771	.0358711	0.32	0.752	-.0596392	.0823935
year_1989	.009436	.0264758	0.36	0.722	-.0429797	.0618518
year_1990	.0324041	.0174063	1.86	0.065	-.0020562	.0668644
year_1991	-.006614	.0278965	-0.24	0.813	-.0618424	.0486145
year_1992	.0149007	.0284544	0.52	0.601	-.0414322	.0712336
year_1993	.0361911	.0187281	1.93	0.056	-.0008861	.0732683
year_1994	-.010629	.0204423	-0.52	0.604	-.0510999	.0298418
year_1995	-.0245433	.0307518	-0.80	0.426	-.0854246	.036338
year_1996	.0410334	.0165679	2.48	0.015	.0082328	.073834
year_1997	.0319769	.0197825	1.62	0.109	-.0071877	.0711415
year_1998	.0087645	.0181049	0.48	0.629	-.0270788	.0446079
year_1999	-.0552819	.0251114	-2.20	0.030	-.1049965	-.0055674
year_2000	.0100845	.0208392	0.48	0.629	-.0311722	.0513412
year_2001	-.0005663	.023373	-0.02	0.981	-.0468394	.0457068
year_2002	-.0054917	.0242415	-0.23	0.821	-.0534841	.0425007
year_2003	.038498	.0228749	1.68	0.095	-.0067889	.0837849
may1631	.0319031	.0182444	1.75	0.083	-.0042166	.0680227
jun115	.0287722	.0177867	1.62	0.108	-.0064412	.0639856
jun1630	.0168771	.0200879	0.84	0.402	-.0228923	.0566464
jul115	-.0036666	.0235737	-0.16	0.877	-.0503371	.0430038
jul1631	-.0292008	.0265974	-1.10	0.274	-.0818573	.0234557
aug115	-.0275749	.0203801	-1.35	0.179	-.0679227	.0127729
cp_batesvi~k	-.0129744	.0182871	-0.71	0.479	-.0491784	.0232297
gdd_batesv~k	.000138	.0004328	0.32	0.750	-.0007188	.0009948
cp2_batesv~k	-.0000354	.0030598	-0.01	0.991	-.0060932	.0060224
gdd2_bates~k	-5.75e-07	1.60e-06	-0.36	0.720	-3.74e-06	2.59e-06
cpgdd_bate~k	.0001726	.0001086	1.59	0.115	-.0000425	.0003876
_cons	.7953897	.0289329	27.49	0.000	.7381093	.85267

Harrington, WA

Linear regression

Number of obs =	154
F(32, 121) =	13.43
Prob > F =	0.0000
R-squared =	0.6796
Root MSE =	.06054

ndvi_harri~a	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0055411	.0205157	0.27	0.788	-.035075	.0461573
year_1984	.0766641	.0454047	1.69	0.094	-.0132265	.1665548
year_1985	-.0120521	.0331741	-0.36	0.717	-.0777289	.0536247
year_1986	-.0116291	.0329141	-0.35	0.724	-.0767912	.053533
year_1987	-.0305642	.0370841	-0.82	0.411	-.103982	.0428535
year_1988	.0077081	.0252721	0.31	0.761	-.0423247	.0577408
year_1989	-.0439594	.0255772	-1.72	0.088	-.0945962	.0066774
year_1990	-.0102323	.0369698	-0.28	0.782	-.0834237	.0629591
year_1991	-.0373052	.0403143	-0.93	0.357	-.1171181	.0425077
year_1992	-.0272441	.0286327	-0.95	0.343	-.0839301	.0294419
year_1993	.0314648	.0251197	1.25	0.213	-.0182662	.0811958
year_1994	.0320917	.0404669	0.79	0.429	-.0480231	.1122066
year_1995	.0129281	.0232946	0.55	0.580	-.0331896	.0590458
year_1996	.073149	.0236012	3.10	0.002	.0264241	.1198738
year_1997	.0460551	.0359358	1.28	0.202	-.0250892	.1171995
year_1998	.0049448	.0252352	0.20	0.845	-.0450148	.0549045
year_1999	-.0233893	.0450894	-0.52	0.605	-.1126556	.065877
year_2000	.0550375	.0307794	1.79	0.076	-.0058984	.1159734
year_2001	.000926	.0244811	0.04	0.970	-.0475407	.0493927
year_2002	.0396546	.0275035	1.44	0.152	-.0147958	.0941051
year_2003	.0168712	.0225081	0.75	0.455	-.0276895	.061432
may1631	.036015	.0230923	1.56	0.121	-.0097023	.0817322
jun115	.0631406	.0207211	3.05	0.003	.0221177	.1041634
jun1630	.041912	.0193342	2.17	0.032	.0036348	.0801892
jul115	-.0162657	.023047	-0.71	0.482	-.0618933	.0293619
jul1631	-.0901115	.030048	-3.00	0.003	-.1495995	-.0306235
aug115	-.1629119	.0198165	-8.22	0.000	-.2021439	-.12368
cp_harring~a	-.0576166	.0544911	-1.06	0.292	-.1654962	.050263
gdd_harrin~a	.0003631	.0007002	0.52	0.605	-.0010232	.0017494
cp2_harrin~a	.0192197	.0335473	0.57	0.568	-.0471961	.0856354
gdd2_harri~a	-6.30e-06	4.85e-06	-1.30	0.197	-.0000159	3.31e-06
cpgdd_harr~a	.0006729	.0012371	0.54	0.587	-.0017762	.003122
_cons	.4382462	.0247085	17.74	0.000	.3893293	.4871632

Everett, WA

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Linear regression                                      Number of obs =     154
                                                       F( 29,   124) =    3.81
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.3803
                                                       Root MSE      =  .06163

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             |               Robust HC3
ndvi_evere~a |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |   .0078865   .0363492     0.22   0.829    -.0640588    .0798318
   year_1984 |  -.1002617   .0452808    -2.21   0.029    -.1898851   -.0106384
   year_1985 |   .0401845   .0532152     0.76   0.452    -.0651434    .1455123
   year_1986 |  -.0418361   .0578241    -0.72   0.471    -.1562863     .072614
   year_1987 |  -.0008327   .0462247    -0.02   0.986    -.0923244    .0906589
   year_1988 |   .0312552   .0376105     0.83   0.408    -.0431865    .1056968
   year_1989 |  -.0327985   .0305674    -1.07   0.285    -.0932999    .0277029
   year_1990 |   .0293598    .037918     0.77   0.440    -.0456907    .1044102
   year_1991 |   .0345358   .0307125     1.12   0.263    -.0262528    .0953245
   year_1992 |   .0545449   .0301925     1.81   0.073    -.0052145    .1143042
   year_1993 |   .0256055    .031942     0.80   0.424    -.0376167    .0888277
   year_1994 |    .031292   .0331575     0.94   0.347    -.0343359      .09692
   year_1995 |   .0437613   .0331105     1.32   0.189    -.0217737    .1092963
   year_1996 |   .0172396    .037226     0.46   0.644    -.0564411    .0909203
   year_1997 |   .0512731   .0337761     1.52   0.132    -.0155792    .1181254
   year_1998 |   .0080893   .0393928     0.21   0.838      -.06988    .0860587
   year_1999 |  -.0334409   .0442952    -0.75   0.452    -.1211136    .0542318
   year_2000 |   -.025353   .0424398    -0.60   0.551    -.1093532    .0586472
   year_2001 |   .0176677   .0303028     0.58   0.561    -.0423101    .0776455
   year_2002 |  -.0044576   .0303636    -0.15   0.884    -.0645556    .0556403
   year_2003 |  -.0133534   .0308478    -0.43   0.666    -.0744098     .047703
     may1631 |   .0092866   .0177648     0.52   0.602     -.025875    .0444482
      jun115 |   .0184379   .0233206     0.79   0.431      -.02772    .0645958
     jun1630 |   .0113146   .0206087     0.55   0.584    -.0294758     .052105
      jul115 |   .0363078   .0169709     2.14   0.034     .0027177     .069898
     jul1631 |   .0484227   .0184804     2.62   0.010     .0118449    .0850006
      aug115 |   .0394944   .0169896     2.32   0.022     .0058673    .0731216
cp_everettwa |  -.0235369   .0239141    -0.98   0.327    -.0708695    .0237957
gdd_everet~a |  (dropped)
cp2_everet~a |   .0043043    .008742     0.49   0.623    -.0129986    .0216071
gdd2_evere~a |  (dropped)
cpgdd_ever~a |  (dropped)
       _cons |   .4910288    .035969    13.65   0.000     .4198361    .5622216
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Eltopia, WA

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Linear regression                                      Number of obs =     154
                                                       F( 32,   121) =    6.50
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.5554
                                                       Root MSE      =   .0381

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             |               Robust HC3
ndvi_eltop~a |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |  -.0054505    .0228514    -0.24   0.812    -.0506909    .0397899
   year_1984 |   .0264788    .0304288     0.87   0.386    -.0337631    .0867207
   year_1985 |  -.0160062    .0184062    -0.87   0.386    -.0524461    .0204337
   year_1986 |    .008303    .0179716     0.46   0.645    -.0272764    .0438824
   year_1987 |  -.0170675    .0184416    -0.93   0.357    -.0535776    .0194426
   year_1988 |  -.0198588    .0190906    -1.04   0.300    -.0576538    .0179361
   year_1989 |   -.052756    .0246561    -2.14   0.034    -.1015693   -.0039427
   year_1990 |  -.0044378    .0192835    -0.23   0.818    -.0426145    .0337389
   year_1991 |   .0036248    .0215183     0.17   0.867    -.0389763     .046226
   year_1992 |   .0227361    .0214062     1.06   0.290     -.019643    .0651153
   year_1993 |  -.0089431    .0230479    -0.39   0.699    -.0545726    .0366863
   year_1994 |   .0349018    .0188267     1.85   0.066    -.0023705    .0721742
   year_1995 |   .0335978    .0211478     1.59   0.115    -.0082699    .0754655
   year_1996 |   .0410858    .0217296     1.89   0.061    -.0019337    .0841053
   year_1997 |   .0148293    .0231096     0.64   0.522    -.0309224    .0605809
   year_1998 |   .0397488    .0184079     2.16   0.033     .0033055    .0761921
   year_1999 |  -.0973181    .0381466    -2.55   0.012    -.1728393   -.0217968
   year_2000 |   .0698279    .0226531     3.08   0.003     .0249801    .1146756
   year_2001 |   .0042403     .019066     0.22   0.824    -.0335059    .0419866
   year_2002 |  -.0058253    .0239614    -0.24   0.808    -.0532633    .0416126
   year_2003 |   .0161297    .0257304     0.63   0.532    -.0348105    .0670699
     may1631 |   .0180481    .0119617     1.51   0.134    -.0056333    .0417294
      jun115 |     .03723    .0111594     3.34   0.001      .015137    .0593229
     jun1630 |   .0480014    .0122283     3.93   0.000     .0237923    .0722104
      jul115 |   .0660735    .0125847     5.25   0.000     .0411587    .0909883
     jul1631 |   .0668289    .0117565     5.68   0.000     .0435539    .0901039
      aug115 |   .0411103    .0140927     2.92   0.004     .0132101    .0690105
cp_eltopiawa |  -.0025721    .0344842    -0.07   0.941    -.0708426    .0656985
gdd_eltopi~a |  -.0007395    .0004285    -1.73   0.087    -.0015878    .0001089
cp2_eltopi~a |  -.0124231    .0292005    -0.43   0.671    -.0702333     .045387
gdd2_eltop~a |   5.55e-06    4.65e-06     1.19   0.234    -3.65e-06    .0000147
cpgdd_elto~a |   .0001789    .0004249     0.42   0.674    -.0006623      .00102
       _cons |   .6073597    .0177403    34.24   0.000     .5722382    .6424812
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Brandenberg, MT

Linear regression

Number of obs	= 154
F(32, 121)	= 7.94
Prob > F	= 0.0000
R-squared	= 0.6524
Root MSE	= .04388

ndvi_brand~t	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.035058	.0204923	-1.71	0.090	-.0756279	.005512
year_1984	-.0101507	.0206373	-0.49	0.624	-.0510076	.0307063
year_1985	-.089907	.0216681	-4.15	0.000	-.1328047	-.0470093
year_1986	-.0257952	.0345847	-0.75	0.457	-.0942647	.0426744
year_1987	-.0421632	.0215427	-1.96	0.053	-.0848127	.0004863
year_1988	-.0828801	.0263894	-3.14	0.002	-.1351248	-.0306354
year_1989	-.0318315	.0200625	-1.59	0.115	-.0715506	.0078876
year_1990	.0380422	.0285558	1.33	0.185	-.0184915	.094576
year_1991	.0673894	.0287816	2.34	0.021	.0104086	.1243701
year_1992	-.0162726	.0216585	-0.75	0.454	-.0591514	.0266062
year_1993	.0196176	.0355546	0.55	0.582	-.0507721	.0900073
year_1994	.0357144	.0264396	1.35	0.179	-.0166299	.0880587
year_1995	.0573181	.0205729	2.79	0.006	.0165886	.0980475
year_1996	-.0019184	.0289754	-0.07	0.947	-.0592828	.055446
year_1997	.0369192	.0191129	1.93	0.056	-.0009199	.0747583
year_1998	-.075126	.0230106	-3.26	0.001	-.1206815	-.0295704
year_1999	-.0154962	.0263867	-0.59	0.558	-.0677356	.0367433
year_2000	-.0203191	.0225604	-0.90	0.370	-.0649835	.0243452
year_2001	-.0209183	.0205062	-1.02	0.310	-.0615157	.019679
year_2002	-.0717929	.0191303	-3.75	0.000	-.1096664	-.0339194
year_2003	.0301925	.0184446	1.64	0.104	-.0063234	.0667084
may1631	.0531057	.0173314	3.06	0.003	.0187937	.0874177
jun115	.0783822	.016955	4.62	0.000	.0448153	.111949
jun1630	.0894496	.0195981	4.56	0.000	.0506499	.1282493
jul115	.0724566	.0206259	3.51	0.001	.0316221	.113291
jul1631	.0490062	.0214487	2.28	0.024	.0065429	.0914694
aug115	.0228609	.0231244	0.99	0.325	-.02292	.0686417
cp_branden~t	-.0101959	.0289472	-0.35	0.725	-.0675045	.0471127
gdd_brande~t	-.0005747	.0008883	-0.65	0.519	-.0023332	.0011839
cp2_brande~t	.0003473	.0084431	0.04	0.967	-.0163681	.0170627
gdd2_brand~t	1.77e-06	6.27e-06	0.28	0.778	-.0000106	.0000142
cpgdd_bran~t	.0002667	.0005082	0.52	0.601	-.0007395	.0012729
_cons	.3949821	.0222613	17.74	0.000	.35091	.4390542

Flatwillow, MT

Linear regression

Number of obs	= 154
F(32, 121)	= 4.87
Prob > F	= 0.0000
R-squared	= 0.5757
Root MSE	= .06548

ndvi_flatw~t	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0711901	.0342244	-2.08	0.040	-.1389464	-.0034339
year_1984	-.0353796	.0346689	-1.02	0.310	-.1040158	.0332566
year_1985	-.1371474	.0349318	-3.93	0.000	-.2063041	-.0679907
year_1986	-.0044888	.0491437	-0.09	0.927	-.1017818	.0928041
year_1987	-.0549796	.0372079	-1.48	0.142	-.1286425	.0186833
year_1988	-.0322294	.0374669	-0.86	0.391	-.1064049	.0419461
year_1989	.0293306	.0399017	0.74	0.464	-.0496654	.1083267
year_1990	-.0255475	.031799	-0.80	0.423	-.088502	.0374069
year_1991	.0910567	.0518738	1.76	0.082	-.0116412	.1937545
year_1992	-.1042937	.0570518	-1.83	0.070	-.2172428	.0086554
year_1993	.0456646	.0363511	1.26	0.211	-.0263021	.1176313
year_1994	.0622018	.0332574	1.87	0.064	-.00364	.1280436
year_1995	.0386843	.0406378	0.95	0.343	-.041769	.1191375
year_1996	.0099276	.0315225	0.31	0.753	-.0524796	.0723347
year_1997	-.0858331	.0359387	-2.39	0.018	-.1569833	-.014683
year_1998	-.0021259	.0402146	-0.05	0.958	-.0817414	.0774896
year_1999	-.0361191	.0313523	-1.15	0.252	-.0981892	.0259509
year_2000	-.1008027	.0336714	-2.99	0.003	-.1674641	-.0341414
year_2001	-.0402148	.0413954	-0.97	0.333	-.122168	.0417384
year_2002	-.0627272	.0357959	-1.75	0.082	-.1335947	.0081403
year_2003	-.0124968	.036162	-0.35	0.730	-.084089	.0590955
may1631	.0244526	.0192479	1.27	0.206	-.0136536	.0625589
jun115	.0449678	.0202331	2.22	0.028	.0049111	.0850246
jun1630	.0802566	.0217397	3.69	0.000	.0372173	.123296
jul115	.0739652	.0249214	2.97	0.004	.0246268	.1233037
jul1631	.0336613	.0313226	1.07	0.285	-.0283501	.0956726
aug115	.0232828	.0330507	0.70	0.483	-.0421498	.0887154
cp_flatwil~t	.017896	.0223153	0.80	0.424	-.0262831	.0620751
gdd_flatwi~t	-.0004215	.0006758	-0.62	0.534	-.0017595	.0009165
cp2_flatwi~t	-.0062353	.0055486	-1.12	0.263	-.0172202	.0047496
gdd2_flatw~t	-8.35e-07	3.11e-06	-0.27	0.789	-6.99e-06	5.32e-06
cpgdd_flat~t	-.0000981	.0003654	-0.27	0.789	-.0008215	.0006252
_cons	.3182767	.0331264	9.61	0.000	.2526942	.3838592

Brownfield, TX

Linear regression

Number of obs =	154
F(30, 123) =	.
Prob > F =	0.0000
R-squared =	1.0000
Root MSE =	1.4e-0

ndvi_brown~x	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	9.11e-09	4.67e-09	1.95	0.053	-1.23e-10	1.83e-08
year_1984	1.10e-09	5.34e-09	0.21	0.838	-9.48e-09	1.17e-08
year_1985	-5.35e-09	3.75e-09	-1.43	0.156	-1.28e-08	2.08e-09
year_1986	-4.07e-09	5.12e-09	-0.79	0.429	-1.42e-08	6.07e-09
year_1987	7.68e-11	5.37e-09	0.01	0.989	-1.06e-08	1.07e-08
year_1988	-3.46e-09	6.18e-09	-0.56	0.577	-1.57e-08	8.78e-09
year_1989	1.82e-09	6.00e-09	0.30	0.763	-1.01e-08	1.37e-08
year_1990	-2.82e-09	4.24e-09	-0.67	0.507	-1.12e-08	5.57e-09
year_1991	-8.66e-10	9.13e-09	-0.09	0.925	-1.89e-08	1.72e-08
year_1992	-3.09e-09	7.20e-09	-0.43	0.668	-1.73e-08	1.12e-08
year_1993	7.44e-09	5.70e-09	1.31	0.194	-3.84e-09	1.87e-08
year_1994	-5.89e-09	5.25e-09	-1.12	0.264	-1.63e-08	4.49e-09
year_1995	8.65e-09	5.62e-09	1.54	0.127	-2.48e-09	1.98e-08
year_1996	5.92e-09	1.36e-08	0.44	0.664	-2.09e-08	3.28e-08
year_1997	4.54e-10	5.63e-09	0.08	0.936	-1.07e-08	1.16e-08
year_1998	3.29e-09	5.65e-09	0.58	0.561	-7.89e-09	1.45e-08
year_1999	-3.74e-09	6.37e-09	-0.59	0.558	-1.63e-08	8.86e-09
year_2000	7.85e-09	7.85e-09	1.00	0.319	-7.69e-09	2.34e-08
year_2001	3.57e-09	6.53e-09	0.55	0.586	-9.36e-09	1.65e-08
year_2002	-7.57e-09	1.09e-08	-0.69	0.489	-2.92e-08	1.40e-08
year_2003	-2.47e-09	4.91e-09	-0.50	0.615	-1.22e-08	7.24e-09
may1631	3.16e-10	3.17e-09	0.10	0.921	-5.97e-09	6.60e-09
jun115	-4.53e-09	3.97e-09	-1.14	0.257	-1.24e-08	3.34e-09
jun1630	-3.25e-09	3.22e-09	-1.01	0.315	-9.63e-09	3.13e-09
jul115	-5.53e-10	4.05e-09	-0.14	0.891	-8.56e-09	7.45e-09
jul1631	1.40e-09	5.04e-09	0.28	0.782	-8.59e-09	1.14e-08
aug115	-6.27e-09	8.24e-09	-0.76	0.448	-2.26e-08	1.00e-08
cp_brownfi~x	-1.63e-10	1.04e-09	-0.16	0.876	-2.22e-09	1.90e-09
gdd_brownf~x	(dropped)					
cp2_brownf~x	4.82e-07	6.16e-07	0.78	0.435	-7.37e-07	1.70e-06
gdd2_brown~x	(dropped)					
cpgdd_brow~x	99999.97	.0365968	.	0.000	99999.9	100000
_cons	4.14e-08	5.28e-08	0.78	0.434	-6.31e-08	1.46e-07

Gonzales, TX

Linear regression

Number of obs	=	153
F(32, 120)	=	10.67
Prob > F	=	0.0000
R-squared	=	0.6141
Root MSE	=	.05492

ndvi_gonza~x	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0144496	.0265544	-0.54	0.587	-.0670254	.0381262
year_1984	-.0799375	.0227925	-3.51	0.001	-.1250651	-.0348099
year_1985	-.0247815	.0330578	-0.75	0.455	-.0902336	.0406706
year_1986	-.0753549	.0304998	-2.47	0.015	-.1357424	-.0149674
year_1987	-.0117619	.0423186	-0.28	0.782	-.0955499	.072026
year_1988	-.0123276	.0210351	-0.59	0.559	-.0539755	.0293204
year_1989	.0030493	.0268298	0.11	0.910	-.0500718	.0561704
year_1990	-.0354235	.0268341	-1.32	0.189	-.0885532	.0177061
year_1991	.0171802	.019386	0.89	0.377	-.0212028	.0555633
year_1992	.0215996	.0238013	0.91	0.366	-.0255254	.0687245
year_1993	.0263485	.0184931	1.42	0.157	-.0102665	.0629635
year_1994	-.0246681	.0332899	-0.74	0.460	-.0905798	.0412436
year_1995	-.0084938	.0229482	-0.37	0.712	-.0539296	.036942
year_1996	-.2032947	.0219959	-9.24	0.000	-.2468451	-.1597444
year_1997	.0246708	.0301989	0.82	0.416	-.0351209	.0844625
year_1998	-.0703109	.0313554	-2.24	0.027	-.1323923	-.0082294
year_1999	-.036101	.0577306	-0.63	0.533	-.1504036	.0782017
year_2000	-.0171373	.0270372	-0.63	0.527	-.0706691	.0363944
year_2001	-.1003226	.0247054	-4.06	0.000	-.1492376	-.0514076
year_2002	-.0557386	.0376863	-1.48	0.142	-.1303549	.0188776
year_2003	-.0387039	.04726	-0.82	0.414	-.1322755	.0548677
may1631	-.0079181	.0173988	-0.46	0.650	-.0423664	.0265302
jun115	-.0106623	.0153801	-0.69	0.489	-.0411138	.0197892
jun1630	-.0458304	.0190463	-2.41	0.018	-.0835409	-.00812
jul115	-.0589957	.0182459	-3.23	0.002	-.0951213	-.0228702
jul1631	-.0610699	.0188058	-3.25	0.002	-.0983041	-.0238357
aug115	-.1089208	.0204166	-5.33	0.000	-.1493442	-.0684974
cp_gonzale~x	-.000323	.0094962	-0.03	0.973	-.0191248	.0184788
gdd_gonzal~x	-.0014917	.0220651	-0.07	0.946	-.0451791	.0421956
cp2_gonzal~x	-.0003094	.0016086	-0.19	0.848	-.0034943	.0028755
gdd2_gonza~x	-.000053	.0015835	-0.03	0.973	-.0031882	.0030821
cpgdd_gonz~x	.0015672	.0057913	0.27	0.787	-.0098992	.0130336
_cons	.6428716	.022102	29.09	0.000	.5991112	.6866319

Matagorda, TX

Linear regression

Number of obs	= 153
F(32, 120)	= 3.08
Prob > F	= 0.0000
R-squared	= 0.4643
Root MSE	= .04852

ndvi_matag~x	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0782358	.0350826	-2.23	0.028	-.147697	-.0087746
year_1984	.0171671	.0185538	0.93	0.357	-.0195682	.0539024
year_1985	.0381115	.0171514	2.22	0.028	.0041529	.0720701
year_1986	.0143441	.0171438	0.84	0.404	-.0195994	.0482877
year_1987	.0151823	.0190196	0.80	0.426	-.0224751	.0528397
year_1988	-.0212414	.0178567	-1.19	0.237	-.0565966	.0141137
year_1989	.0591108	.0298439	1.98	0.050	.000022	.1181997
year_1990	-.0181945	.0231746	-0.79	0.434	-.0640785	.0276896
year_1991	-.0198599	.0302423	-0.66	0.513	-.0797375	.0400177
year_1992	.0494719	.0245251	2.02	0.046	.0009139	.09803
year_1993	.0327257	.0195735	1.67	0.097	-.0060285	.0714798
year_1994	.0330454	.0230282	1.43	0.154	-.0125489	.0786397
year_1995	.0330833	.0305168	1.08	0.280	-.0273378	.0935045
year_1996	-.0472487	.0209275	-2.26	0.026	-.0886837	-.0058137
year_1997	-.0414385	.0275005	-1.51	0.134	-.0958876	.0130107
year_1998	-.0842867	.0317224	-2.66	0.009	-.1470949	-.0214785
year_1999	-.0776512	.0570838	-1.36	0.176	-.1906733	.0353708
year_2000	-.0557878	.0342772	-1.63	0.106	-.1236544	.0120787
year_2001	-.0771688	.032441	-2.38	0.019	-.1413997	-.0129378
year_2002	-.0874113	.0372104	-2.35	0.020	-.1610852	-.0137374
year_2003	-.0460176	.0353892	-1.30	0.196	-.1160858	.0240505
may1631	.0184425	.0198141	0.93	0.354	-.0207881	.0576732
jun115	.0268049	.0260737	1.03	0.306	-.0248192	.0784289
jun1630	.0416149	.0337393	1.23	0.220	-.0251867	.1084164
jul115	.044681	.0313513	1.43	0.157	-.0173925	.1067544
jul1631	.0451409	.0314732	1.43	0.154	-.0171739	.1074556
aug115	.0404366	.0301719	1.34	0.183	-.0193017	.1001749
cp_matagor~x	.0016872	.0108907	0.15	0.877	-.0198756	.02325
gdd_matago~x	-.0009583	.0008279	-1.16	0.249	-.0025975	.0006809
cp2_matago~x	-.0005606	.0019459	-0.29	0.774	-.0044134	.0032922
gdd2_matag~x	4.61e-06	4.85e-06	0.95	0.344	-4.99e-06	.0000142
cpgdd_mata~x	-.0000539	.0000969	-0.56	0.579	-.0002458	.000138
_cons	.5940742	.0224266	26.49	0.000	.549671	.6384774

Tulia, TX

```
Linear regression                                      Number of obs =     154
                                                       F( 29,   124) =    7.04
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.5539
                                                       Root MSE      =  .05623
```

ndvi_tuliatx	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0281671	.0420408	0.67	0.504	-.0550434	.1113777
year_1984	-.0265483	.0389118	-0.68	0.496	-.1035656	.050469
year_1985	-.0692729	.0372197	-1.86	0.065	-.1429412	.0043954
year_1986	-.0246514	.0347184	-0.71	0.479	-.0933688	.0440661
year_1987	-.0034911	.03271	-0.11	0.915	-.0682333	.0612511
year_1988	.1186583	.0344287	3.45	0.001	.0505143	.1868023
year_1989	.0176907	.0435862	0.41	0.686	-.0685787	.1039601
year_1990	-.003792	.0386092	-0.10	0.922	-.0802104	.0726263
year_1991	.0474187	.0384983	1.23	0.220	-.0287802	.1236176
year_1992	.0272243	.0396144	0.69	0.493	-.0511838	.1056324
year_1993	.026479	.036532	0.72	0.470	-.045828	.098786
year_1994	.0835271	.0359481	2.32	0.022	.0123757	.1546785
year_1995	.0552489	.0378859	1.46	0.147	-.019738	.1302358
year_1996	.0043562	.0390198	0.11	0.911	-.072875	.0815873
year_1997	.0892351	.0417494	2.14	0.035	.0066014	.1718688
year_1998	.010737	.0401162	0.27	0.789	-.0686641	.0901382
year_1999	.0564672	.036304	1.56	0.122	-.0153886	.1283231
year_2000	.0941618	.0344401	2.73	0.007	.0259951	.1623285
year_2001	.0063749	.0441852	0.14	0.886	-.08108	.0938297
year_2002	-.0716873	.0469562	-1.53	0.129	-.1646268	.0212522
year_2003	-.0759806	.0370862	-2.05	0.043	-.1493845	-.0025766
may1631	-.0043364	.0210465	-0.21	0.837	-.0459933	.0373204
jun115	-.0017131	.0188248	-0.09	0.928	-.0389727	.0355464
jun1630	.0039367	.019032	0.21	0.836	-.033733	.0416064
jul115	.0185194	.018483	1.00	0.318	-.0180636	.0551024
jul1631	.0273157	.0191807	1.42	0.157	-.0106483	.0652797
aug115	.0390302	.022496	1.73	0.085	-.0054956	.083556
cp_tuliatx	.0144195	.0092522	1.56	0.122	-.0038932	.0327322
gdd_tuliatx	(dropped)					
cp2_tuliatx	-.0018874	.001537	-1.23	0.222	-.0049295	.0011547
gdd2_tuliatx	(dropped)					
cpgdd_tuli~x	(dropped)					
_cons	.3082402	.0354237	8.70	0.000	.2381269	.3783535

Menomonie, TX

```
Linear regression                                      Number of obs =     154
                                                       F( 32,   121) =   18.10
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.7960
                                                       Root MSE      =  .04416

------------------------------------------------------------------------------
             |             Robust HC3
ndvi_menom~e |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   year_1983 |  -.0364066   .0132113    -2.76   0.007    -.0625619   -.0102514
   year_1984 |   .0326507   .0206862     1.58   0.117    -.0083031    .0736045
   year_1985 |  -.0023887   .0327482    -0.07   0.942    -.0672224     .062445
   year_1986 |  -.0117229   .0161278    -0.73   0.469    -.0436521    .0202063
   year_1987 |  -.0221536   .0147284    -1.50   0.135    -.0513122    .0070051
   year_1988 |  -.0275173    .015291    -1.80   0.074    -.0577898    .0027552
   year_1989 |   .0159809   .0210513     0.76   0.449    -.0256956    .0576574
   year_1990 |   -.018443   .0176395    -1.05   0.298     -.053365    .0164791
   year_1991 |  -.0167713   .0171748    -0.98   0.331    -.0507733    .0172308
   year_1992 |   .0312075   .0156603     1.99   0.049     .0002039    .0622112
   year_1993 |  -.0341212   .0242941    -1.40   0.163    -.0822178    .0139754
   year_1994 |   .0247872   .0124609     1.99   0.049     .0001176    .0494568
   year_1995 |   -.010081   .0168426    -0.60   0.551    -.0434254    .0232634
   year_1996 |    .006224   .0246681     0.25   0.801     -.042613     .055061
   year_1997 |  -.0498296   .0287981    -1.73   0.086    -.1068429    .0071838
   year_1998 |  -.0366353   .0377293    -0.97   0.333    -.1113304    .0380598
   year_1999 |  -.0733821   .0302226    -2.43   0.017    -.1332156   -.0135486
   year_2000 |  -.0272206   .0145379    -1.87   0.064    -.0560023     .001561
   year_2001 |  -.0129338    .012519    -1.03   0.304    -.0377183    .0118508
   year_2002 |  -.0239319   .0157844    -1.52   0.132    -.0551813    .0073176
   year_2003 |  -.0469591    .012888    -3.64   0.000    -.0724742    -.021444
     may1631 |   .0820117   .0158044     5.19   0.000     .0507226    .1133008
      jun115 |   .1297563   .0195742     6.63   0.000     .0910039    .1685087
     jun1630 |   .1629365   .0183179     8.89   0.000     .1266713    .1992017
      jul115 |   .1871276   .0194565     9.62   0.000     .1486084    .2256467
     jul1631 |   .2066439   .0208285     9.92   0.000     .1654083    .2478794
      aug115 |   .1981305   .0183012    10.83   0.000     .1618985    .2343624
cp_menomonie |   .0102678   .0102381     1.00   0.318    -.0100012    .0305368
 gdd_menonie |   .0008236   .0006795     1.21   0.228    -.0005216    .0021687
cp2_menemo~e |  -.0018679   .0016214    -1.15   0.252     -.005078    .0013422
gdd2_menem~i |  -8.07e-06   7.68e-06    -1.05   0.295    -.0000233    7.13e-06
cpgdd_meno~i |  -.0000293   .0001199    -0.24   0.807    -.0002667     .000208
       _cons |   .5483372   .0165771    33.08   0.000     .5155185     .581156
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Dalton, WI

```
Linear regression                                      Number of obs =     154
                                                       F( 32,   121) =   18.87
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.8330
                                                       Root MSE      =  .04538
```

ndvi_dalto~i	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0042897	.0260234	-0.16	0.869	-.0558099	.0472305
year_1984	.0073105	.0184716	0.40	0.693	-.0292589	.0438798
year_1985	.02858	.0268999	1.06	0.290	-.0246754	.0818355
year_1986	.0586936	.0184171	3.19	0.002	.022232	.0951551
year_1987	.0353071	.0237498	1.49	0.140	-.0117119	.0823262
year_1988	.0071359	.0295398	0.24	0.810	-.051346	.0656177
year_1989	-.0265031	.0205167	-1.29	0.199	-.0671214	.0141151
year_1990	.0142635	.0216989	0.66	0.512	-.0286952	.0572222
year_1991	.0758968	.0272513	2.79	0.006	.0219456	.1298479
year_1992	.0320593	.0226946	1.41	0.160	-.0128707	.0769893
year_1993	.0226808	.0168362	1.35	0.180	-.010651	.0560125
year_1994	.010693	.0265981	0.40	0.688	-.041965	.063351
year_1995	.0122155	.0216467	0.56	0.574	-.0306398	.0550707
year_1996	.00229	.0289893	0.08	0.937	-.055102	.0596819
year_1997	.0107551	.0243647	0.44	0.660	-.0374813	.0589915
year_1998	.0474545	.0270006	1.76	0.081	-.0060004	.1009093
year_1999	-.0282877	.0402861	-0.70	0.484	-.1080446	.0514692
year_2000	-.0023978	.0186308	-0.13	0.898	-.0392824	.0344868
year_2001	.0258172	.0317652	0.81	0.418	-.0370704	.0887049
year_2002	-.0025823	.0194891	-0.13	0.895	-.0411661	.0360016
year_2003	-.0033031	.0200835	-0.16	0.870	-.0430637	.0364575
may1631	.0830623	.0176487	4.71	0.000	.0481221	.1180024
jun115	.1604417	.0177393	9.04	0.000	.1253221	.1955613
jun1630	.2033969	.0169784	11.98	0.000	.1697836	.2370103
jul115	.2374799	.0198115	11.99	0.000	.1982578	.2767021
jul1631	.238948	.0195571	12.22	0.000	.2002295	.2776665
aug115	.2402543	.016627	14.45	0.000	.2073367	.2731718
cp_daltonwi	-.0154388	.0109624	-1.41	0.162	-.0371418	.0062641
gdd_daltonwi	-.0000181	.0008089	-0.02	0.982	-.0016194	.0015833
cp2_daltonwi	.0017872	.0016913	1.06	0.293	-.0015612	.0051356
gdd2_dalto~i	-3.64e-06	9.04e-06	-0.40	0.688	-.0000215	.0000143
cpgdd_dalt~i	.0000745	.0002253	0.33	0.742	-.0003716	.0005206
_cons	.5494448	.0218259	25.17	0.000	.5062347	.592655

Arlington, WI

Linear regression

Number of obs	= 154
F(32, 121)	= 13.71
Prob > F	= 0.0000
R-squared	= 0.7685
Root MSE	= .06115

ndvi_arlin~i	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0311812	.0309049	-1.01	0.315	-.0923656	.0300033
year_1984	.0305942	.0285047	1.07	0.285	-.0258384	.0870268
year_1985	.0447327	.0176595	2.53	0.013	.009771	.0796943
year_1986	.0525057	.0184648	2.84	0.005	.0159497	.0890617
year_1987	.0469037	.0358569	1.31	0.193	-.0240845	.1178919
year_1988	.0520586	.0366486	1.42	0.158	-.0204969	.1246141
year_1989	.0101322	.0261366	0.39	0.699	-.0416122	.0618765
year_1990	-.0194676	.0294006	-0.66	0.509	-.0776739	.0387387
year_1991	.041642	.0204218	2.04	0.044	.0012116	.0820724
year_1992	.0098376	.0189206	0.52	0.604	-.0276208	.047296
year_1993	-.004338	.0251164	-0.17	0.863	-.0540625	.0453865
year_1994	.0141119	.0468599	0.30	0.764	-.0786596	.1068834
year_1995	.0061696	.0249704	0.25	0.805	-.043266	.0556052
year_1996	.0232164	.022092	1.05	0.295	-.0205205	.0669533
year_1997	.0107037	.0307613	0.35	0.728	-.0501963	.0716037
year_1998	-.0072959	.0298606	-0.24	0.807	-.0664128	.0518211
year_1999	-.0680142	.0586715	-1.16	0.249	-.1841699	.0481415
year_2000	.0090389	.0192626	0.47	0.640	-.0290965	.0471743
year_2001	-.0374038	.0333927	-1.12	0.265	-.1035135	.0287058
year_2002	-.0260043	.0347651	-0.75	0.456	-.094831	.0428224
year_2003	-.0264354	.0373229	-0.71	0.480	-.1003259	.0474552
may1631	.035012	.0188505	1.86	0.066	-.0023076	.0723316
jun115	.1048855	.0205967	5.09	0.000	.0641089	.1456622
jun1630	.165954	.0178222	9.31	0.000	.1306703	.2012378
jul115	.2352101	.0205394	11.45	0.000	.194547	.2758732
jul1631	.2524576	.0257254	9.81	0.000	.2015274	.3033878
aug115	.2608404	.0191842	13.60	0.000	.2228603	.2988206
cp_arlingt~i	-.0131139	.0129877	-1.01	0.315	-.0388266	.0125987
gdd_arling~i	-.0010063	.0010228	-0.98	0.327	-.0030313	.0010187
cp2_arling~i	.0012638	.0015249	0.83	0.409	-.0017552	.0042827
gdd2_arlin~i	-2.96e-06	7.48e-06	-0.40	0.693	-.0000178	.0000118
cpgdd_arli~i	.0003149	.0003466	0.91	0.365	-.0003713	.001001
_cons	.5203711	.023418	22.22	0.000	.4740091	.5667332

Luck, WI

```
Linear regression                                      Number of obs =     154
                                                       F( 32,   121) =   15.81
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.8308
                                                       Root MSE      =  .05169
```

ndvi_luckwi	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.0568647	.0233613	-2.43	0.016	-.1031146	-.0106149
year_1984	.0240334	.0147177	1.63	0.105	-.0051041	.053171
year_1985	-.0088068	.0339522	-0.26	0.796	-.0760242	.0584106
year_1986	.0040527	.0157635	0.26	0.798	-.0271554	.0352608
year_1987	-.0754585	.0358281	-2.11	0.037	-.1463897	-.0045273
year_1988	-.0294435	.0335509	-0.88	0.382	-.0958663	.0369793
year_1989	-.0449946	.0257859	-1.74	0.084	-.0960447	.0060555
year_1990	-.0670903	.0119819	-5.60	0.000	-.0908116	-.043369
year_1991	-.0283138	.0221296	-1.28	0.203	-.0721252	.0154975
year_1992	.0177597	.0235007	0.76	0.451	-.028766	.0642855
year_1993	-.0259828	.0268079	-0.97	0.334	-.0790561	.0270904
year_1994	-.0165821	.0144502	-1.15	0.253	-.04519	.0120259
year_1995	.0048747	.0260798	0.19	0.852	-.0467572	.0565066
year_1996	.0017983	.0251399	0.07	0.943	-.0479728	.0515694
year_1997	-.0196098	.0295734	-0.66	0.509	-.0781581	.0389385
year_1998	-.0807289	.0403516	-2.00	0.048	-.1606156	-.0008421
year_1999	-.0459335	.0258602	-1.78	0.078	-.0971306	.0052636
year_2000	-.0673836	.0173153	-3.89	0.000	-.1016639	-.0331034
year_2001	-.0397917	.0223295	-1.78	0.077	-.0839989	.0044155
year_2002	-.0689366	.027611	-2.50	0.014	-.1235999	-.0142733
year_2003	-.0804032	.0254604	-3.16	0.002	-.1308087	-.0299977
may1631	.1430576	.0225114	6.35	0.000	.0984904	.1876247
jun115	.2216417	.0233305	9.50	0.000	.1754529	.2678306
jun1630	.2692031	.0214092	12.57	0.000	.226818	.3115882
jul115	.2796405	.0228158	12.26	0.000	.2344705	.3248105
jul1631	.2756873	.0218622	12.61	0.000	.2324053	.3189692
aug115	.2613755	.0225566	11.59	0.000	.2167187	.3060323
cp_luckwi	-.017535	.0138936	-1.26	0.209	-.045041	.0099711
gdd_luckwi	.0002113	.0011526	0.18	0.855	-.0020707	.0024932
cp2_luckwi	.002957	.0024031	1.23	0.221	-.0018004	.0077145
gdd2_luckwi	-.0000137	.0000154	-0.89	0.373	-.0000442	.0000167
cpgdd_luckwi	.0002343	.0003208	0.73	0.467	-.0004009	.0008695
_cons	.592426	.0262462	22.57	0.000	.5404647	.6443873

Shippensburg, PA

Linear regression

Number of obs =	154
F(32, 121) =	10.09
Prob > F =	0.0000
R-squared =	0.5150
Root MSE =	.06938

ndvi_shipp~a	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	-.013201	.0432358	-0.31	0.761	-.0987976	.0723956
year_1984	-.0715554	.033183	-2.16	0.033	-.13725	-.0058609
year_1985	.0507484	.0319017	1.59	0.114	-.0124094	.1139063
year_1986	-.0226963	.0288543	-0.79	0.433	-.079821	.0344283
year_1987	.0022027	.0435882	0.05	0.960	-.0840917	.0884971
year_1988	-.0642991	.0273248	-2.35	0.020	-.1183957	-.0102025
year_1989	-.0520266	.0339565	-1.53	0.128	-.1192525	.0151993
year_1990	.0895334	.0449253	1.99	0.049	.0005919	.1784749
year_1991	-.0599186	.0563339	-1.06	0.290	-.1714465	.0516092
year_1992	.0103299	.0366057	0.28	0.778	-.0621408	.0828006
year_1993	.0388453	.0334251	1.16	0.247	-.0273286	.1050191
year_1994	.0458523	.0353188	1.30	0.197	-.0240705	.1157751
year_1995	-.0934135	.0394872	-2.37	0.020	-.1715888	-.0152381
year_1996	.0067701	.0293786	0.23	0.818	-.0513925	.0649327
year_1997	.0823736	.0267561	3.08	0.003	.0294027	.1353444
year_1998	.0185231	.029813	0.62	0.536	-.0404995	.0775458
year_1999	-.0755848	.0652089	-1.16	0.249	-.204683	.0535133
year_2000	.0048905	.0247741	0.20	0.844	-.0441564	.0539374
year_2001	.0523029	.0218761	2.39	0.018	.0089935	.0956123
year_2002	.022422	.020935	1.07	0.286	-.0190244	.0638684
year_2003	-.0574766	.0345785	-1.66	0.099	-.1259338	.0109807
may1631	.0586347	.0195328	3.00	0.003	.0199644	.0973051
jun115	.0789695	.0206427	3.83	0.000	.0381018	.1198372
jun1630	.103363	.0194369	5.32	0.000	.0648825	.1418436
jul115	.1165226	.0252435	4.62	0.000	.0665464	.1664987
jul1631	.1143348	.0223579	5.11	0.000	.0700714	.1585983
aug115	.1105026	.0213807	5.17	0.000	.0681738	.1528314
cp_shippen~a	-.0062832	.014385	-0.44	0.663	-.0347621	.0221957
gdd_shippe~a	.0027244	.0075676	0.36	0.719	-.0122575	.0177064
cp2_shippe~a	.0027755	.002243	1.24	0.218	-.0016651	.0072161
gdd2_shipp~a	-.0000742	.0001425	-0.52	0.603	-.0003564	.0002079
cpgdd_shep~a	-.000934	.0016377	-0.57	0.570	-.0041764	.0023083
_cons	.6750596	.0231448	29.17	0.000	.6292383	.7208809

Sellingsgrove, PA

Linear regression

Number of obs	= 154
F(29, 124)	= 3.58
Prob > F	= 0.0000
R-squared	= 0.4636
Root MSE	= .04674

ndvi_selli~a	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.015246	.0172762	0.88	0.379	-.0189484	.0494404
year_1984	-.0092806	.0281678	-0.33	0.742	-.0650325	.0464713
year_1985	.0089963	.0153983	0.58	0.560	-.0214812	.0394737
year_1986	-.0099774	.0222544	-0.45	0.655	-.0540251	.0340704
year_1987	.0154493	.0203132	0.76	0.448	-.0247561	.0556547
year_1988	-.0392889	.0230051	-1.71	0.090	-.0848226	.0062447
year_1989	-.0104979	.0263638	-0.40	0.691	-.0626791	.0416834
year_1990	.0379548	.0203726	1.86	0.065	-.0023683	.0782779
year_1991	.0410676	.0179075	2.29	0.024	.0056237	.0765116
year_1992	.0272	.0206277	1.32	0.190	-.013628	.068028
year_1993	-.0085502	.0155091	-0.55	0.582	-.039247	.0221467
year_1994	.0168422	.0297888	0.57	0.573	-.0421182	.0758026
year_1995	-.0459423	.0414172	-1.11	0.269	-.1279186	.036034
year_1996	.0105766	.0223779	0.47	0.637	-.0337154	.0548687
year_1997	.0016892	.0193662	0.09	0.931	-.0366419	.0400203
year_1998	.0035236	.0208343	0.17	0.866	-.0377134	.0447605
year_1999	-.0745858	.0372895	-2.00	0.048	-.1483921	-.0007795
year_2000	-.0052366	.0178661	-0.29	0.770	-.0405986	.0301255
year_2001	-.0108769	.0215467	-0.50	0.615	-.0535238	.03177
year_2002	.0078806	.0186382	0.42	0.673	-.0290097	.0447709
year_2003	-.023636	.0182139	-1.30	0.197	-.0596864	.0124144
may1631	.0528045	.0157605	3.35	0.001	.02161	.083999
jun115	.0637119	.0143691	4.43	0.000	.0352714	.0921523
jun1630	.0698435	.0182156	3.83	0.000	.0337897	.1058972
jul115	.0798786	.01549	5.16	0.000	.0492195	.1105376
jul1631	.0940699	.0143497	6.56	0.000	.0656677	.122472
aug115	.085483	.0138894	6.15	0.000	.0579921	.112974
cp_sellins~a	-.0113537	.012069	-0.94	0.349	-.0352416	.0125341
gdd_sellin~a	(dropped)					
cp2_sellin~a	.0012892	.0024541	0.53	0.600	-.0035682	.0061466
gdd2_selli~a	(dropped)					
cpgdd_sell~a	(dropped)					
_cons	.657795	.0193304	34.03	0.000	.6195349	.6960552

Montrose, PA

Linear regression

Number of obs	= 154
F(29, 124)	= 8.57
Prob > F	= 0.0000
R-squared	= 0.6463
Root MSE	= .05773

ndvi_montr~a	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0235783	.0391134	0.60	0.548	-.0538382	.1009947
year_1984	.0194378	.0415136	0.47	0.640	-.0627293	.1016048
year_1985	.0933952	.030759	3.04	0.003	.0325146	.1542758
year_1986	.0232428	.0390237	0.60	0.553	-.0539959	.1004816
year_1987	.0612605	.031616	1.94	0.055	-.0013164	.1238374
year_1988	.0128387	.0322579	0.40	0.691	-.0510088	.0766862
year_1989	-.0659158	.0352401	-1.87	0.064	-.1356657	.0038342
year_1990	-.0119828	.0294022	-0.41	0.684	-.0701779	.0462124
year_1991	.0600806	.0306337	1.96	0.052	-.0005519	.1207132
year_1992	.0682436	.0331164	2.06	0.041	.002697	.1337903
year_1993	.0202391	.0346355	0.58	0.560	-.0483143	.0887925
year_1994	.0088343	.0430743	0.21	0.838	-.0764218	.0940905
year_1995	.0209776	.0412	0.51	0.612	-.0605689	.102524
year_1996	.0253779	.0312038	0.81	0.418	-.0363832	.0871389
year_1997	.0333402	.0377026	0.88	0.378	-.0412838	.1079642
year_1998	.0032642	.0325129	0.10	0.920	-.0610879	.0676162
year_1999	-.0584305	.040384	-1.45	0.150	-.1383617	.0215008
year_2000	-.0163173	.0289766	-0.56	0.574	-.0736702	.0410356
year_2001	-.0010529	.0346527	-0.03	0.976	-.0696403	.0675345
year_2002	-.0133537	.0327275	-0.41	0.684	-.0781306	.0514231
year_2003	-.0451561	.0436118	-1.04	0.302	-.1314761	.041164
may1631	.0875197	.0223563	3.91	0.000	.0432704	.131769
jun115	.1428988	.0185489	7.70	0.000	.1061853	.1796122
jun1630	.1598138	.0203191	7.87	0.000	.1195966	.2000311
jul115	.1687001	.0165353	10.20	0.000	.1359722	.201428
jul1631	.1587688	.0185996	8.54	0.000	.1219551	.1955826
aug115	.1650097	.0200229	8.24	0.000	.1253787	.2046407
cp_montros~a	.0058661	.0132359	0.44	0.658	-.0203315	.0320638
gdd_montro~a	(dropped)					
cp2_montro~a	-.0018332	.0023135	-0.79	0.430	-.0064122	.0027457
gdd2_montr~a	(dropped)					
cpgdd_mont~a	(dropped)					
_cons	.6416851	.0317556	20.21	0.000	.5788319	.7045383

Lagrange, WY

Linear regression

Number of obs	= 153
F(32, 120)	= 5.48
Prob > F	= 0.0000
R-squared	= 0.5516
Root MSE	= .05359

ndvi_lagra~y	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
year_1983	.0459198	.0294397	1.56	0.121	-.0123687	.1042083
year_1984	-.007125	.0347048	-0.21	0.838	-.075838	.0615881
year_1985	-.0251933	.0371397	-0.68	0.499	-.0987273	.0483408
year_1986	-.0397831	.0338362	-1.18	0.242	-.1067765	.0272103
year_1987	.0222274	.0283283	0.78	0.434	-.0338606	.0783155
year_1988	.0247396	.0348443	0.71	0.479	-.0442497	.093729
year_1989	-.0280631	.0399198	-0.70	0.483	-.1071016	.0509753
year_1990	.0306483	.0372534	0.82	0.412	-.0431109	.1044075
year_1991	.047113	.0334515	1.41	0.162	-.0191187	.1133447
year_1992	.0113872	.0371686	0.31	0.760	-.062204	.0849784
year_1993	.0649049	.0311551	2.08	0.039	.0032201	.1265898
year_1994	.0787694	.0359433	2.19	0.030	.0076042	.1499346
year_1995	.04049	.0341644	1.19	0.238	-.0271532	.1081332
year_1996	.0658429	.0344924	1.91	0.059	-.0024496	.1341354
year_1997	.0175426	.0344237	0.51	0.611	-.0506139	.085699
year_1998	.0396444	.0404991	0.98	0.330	-.0405409	.1198297
year_1999	.0391171	.0478367	0.82	0.415	-.0555962	.1338305
year_2000	.032246	.0340106	0.95	0.345	-.0350926	.0995846
year_2001	.0492492	.0504304	0.98	0.331	-.0505995	.1490979
year_2002	-.0392638	.0403465	-0.97	0.332	-.119147	.0406195
year_2003	.0913129	.0388875	2.35	0.021	.0143184	.1683074
may1631	.0495859	.0199815	2.48	0.014	.0100239	.089148
jun115	.0907997	.0191061	4.75	0.000	.052971	.1286284
jun1630	.1100974	.0202931	5.43	0.000	.0699185	.1502763
jul115	.1414999	.0212413	6.66	0.000	.0994435	.1835562
jul1631	.1405685	.0234287	6.00	0.000	.0941814	.1869557
aug115	.123032	.0241615	5.09	0.000	.0751939	.1708701
cp_lagrang~y	-.0128408	.0160294	-0.80	0.425	-.0445779	.0188963
gdd_lagran~y	-.0006562	.000717	-0.92	0.362	-.0020757	.0007634
cp2_lagran~y	.0021316	.0037566	0.57	0.571	-.0053061	.0095694
gdd2_lagra~y	4.05e-07	5.08e-06	0.08	0.937	-9.66e-06	.0000105
cpgdd_lagr~y	-.0000991	.0002389	-0.42	0.679	-.0005721	.0003738
_cons	.3667029	.0318479	11.51	0.000	.3036462	.4297596

APPENDIX B

Regression Results for Yields, NDVI, and Meteorological Variables

Regression results for corn yields

Algona, IA

```
Linear regression                                      Number of obs =      22
                                                       F(  9,    12) =    2.84
                                                       Prob > F      =  0.0474
                                                       R-squared     =  0.8620
                                                       Root MSE      =    11.1

------------------------------------------------------------------------------
             |             Robust HC3
algonaia_y~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
algonaia_m~i |  -22847.32   14501.07    -1.58   0.141    -54442.44     8747.79
   algona_cp |  -32.89877   51.88791    -0.63   0.538    -145.9528    80.15528
  algona_gdd |  -5.772619   6.429668    -0.90   0.387    -19.78166    8.236423
alongona_m~2 |   13449.37   8578.839     1.57   0.143    -5242.312    32141.06
  algona_cp2 |  -.3987686    .259581    -1.54   0.150     -.964347    .1668098
 algona_gdd2 |   .0014442   .0024854     0.58   0.572     -.003971    .0068594
algona_cpgdd |   .0510982   .0589368     0.87   0.403     -.077314    .1795104
algona_ndv~p |   51.93642   56.33731     0.92   0.375    -70.81203    174.6849
algona_ndv~d |   5.631134   6.585469     0.86   0.409     -8.71737    19.97964
       _cons |   9784.032   6141.698     1.59   0.137    -3597.579    23165.64
------------------------------------------------------------------------------
```

Rockrapids, IA

```
Linear regression                                      Number of obs =      22
                                                       F(  5,    16) =    3.63
                                                       Prob > F      =  0.0220
                                                       R-squared     =  0.5286
                                                       Root MSE      =  20.064

------------------------------------------------------------------------------
             |             Robust HC3
rockrapids~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
rockrapids~i |   18664.42    14984.6     1.25   0.231     -13101.5    50430.35
rockrapi~_cp |   40.93124   52.68734     0.78   0.449    -70.76093    152.6234
rockrap~_gdd |  (dropped)
rockrapid~i2 |  -10129.68   8530.861    -1.19   0.252     -28214.3    7954.933
rockrapid~p2 |   .3128427   .5048767     0.62   0.544     -.757448    1.383133
rockrapid~d2 |  (dropped)
rockrap~pgdd |  (dropped)
rockrapi~icp |  -58.27752   55.03966    -1.06   0.305    -174.9564    58.40134
rockrap~igdd |  (dropped)
       _cons |  -8357.205   6555.566    -1.27   0.221    -22254.38    5539.973
------------------------------------------------------------------------------
```

Saluda, SC

```
Linear regression                                      Number of obs =      22
                                                       F(  6,    13) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.6606
                                                       Root MSE      =  20.537

------------------------------------------------------------------------------
             |             Robust HC3
saluda_yie~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
saludasc_m~i |  -5162.909   13404.89    -0.39   0.706    -34122.41    23796.59
   saluda_cp |   1.414855   29.85728     0.05   0.963    -63.08787    65.91758
  saluda_gdd |   14.25214   11.96689     1.19   0.255    -11.60075    40.10502
saluda_ndvi2 |    3094.49   8757.491     0.35   0.729    -15824.92     22013.9
  saluda_cp2 |  -.0442941   .2597625    -0.17   0.867    -.6054768    .5168886
 saluda_gdd2 |  -.7647906   .3428671    -2.23   0.044     -1.50551   -.0240713
saluda_cpgdd |  -.1892139   .9618443    -0.20   0.847    -2.267152    1.888724
saluda_ndv~p |   4.016267   41.93387     0.10   0.925    -86.57634    94.60888
saluda_ndv~d |  (dropped)
       _cons |   2150.967    5099.64     0.42   0.680    -8866.135    13168.07
------------------------------------------------------------------------------
```

Dublin, GA

```
Linear regression                                      Number of obs =      22
                                                       F(  8,    12) =       .
                                                       Prob > F      =       .
                                                       R-squared     =  0.5419
                                                       Root MSE      =  22.012

------------------------------------------------------------------------------
             |             Robust HC3
dublinga_y~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
dublinga_m~i |   5928.043   15530.68     0.38   0.709    -27910.41     39766.5
   dublin_cp |   50.88298   109.3146     0.47   0.650     -187.293    289.0589
  dublin_gdd |   940.5228   1213.476     0.78   0.453    -1703.415     3584.46
dublin_ndvi2 |  -4358.616   12669.88    -0.34   0.737    -31963.91    23246.68
  dublin_cp2 |   .2108548   1.254422     0.17   0.869    -2.522296    2.944005
 dublin_gdd2 |  -1.122528   2.160638    -0.52   0.613    -5.830154    3.585098
dublin_cpgdd |   1.172193   2.732283     0.43   0.676     -4.78094    7.125326
dublin_ndv~p |  -79.49889   189.6148    -0.42   0.682    -492.6341    333.6363
dublin_ndv~d |  -1473.105   1899.087    -0.78   0.453     -5610.86    2664.649
       _cons |  -1939.243   4821.581    -0.40   0.695    -12444.57    8566.081
------------------------------------------------------------------------------
```

Booneville, MS

```
Linear regression                                      Number of obs =      20
                                                       F(  6,    13) =    1.29
                                                       Prob > F      =  0.3291
                                                       R-squared     =  0.3436
                                                       Root MSE      =  13.708

------------------------------------------------------------------------------
             |             Robust HC3
booneville~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
booneville~i |    4152.53   7477.348     0.56   0.588     -12001.3    20306.36
boonevil~_cp |    10.4921   24.16021     0.43   0.671    -41.70286    62.68706
boonevi~_gdd |  (dropped)
boonevill~i2 |  -2725.497   4757.843    -0.57   0.577    -13004.19    7553.198
boonevill~p2 |  -.1605949   .1718917    -0.93   0.367    -.5319444    .2107545
boonevill~d2 |  (dropped)
boonevi~pgdd |  -.0394621   .1350786    -0.29   0.775    -.3312817    .2523575
boonevil~icp |  -5.696794   28.86732    -0.20   0.847    -68.06084    56.66725
boonevi~igdd |  (dropped)
       _cons |  -1555.323   2928.342    -0.53   0.604    -7881.621    4770.974
------------------------------------------------------------------------------
```

Watervalley, MS

Linear regression

Number of obs	= 22
F(9, 12)	= 1.44
Prob > F	= 0.2729
R-squared	= 0.4371
Root MSE	= 19.864

watervalle~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
watervalle~i	9721.891	13227.12	0.73	0.476	-19097.53	38541.32
waterval~_cp	-36.63724	78.36191	-0.47	0.648	-207.3732	134.0987
waterva~_gdd	100.7871	166.9041	0.60	0.557	-262.8658	464.4399
watervall~i2	-5995.746	8216.099	-0.73	0.480	-23897.09	11905.6
watervall~p2	-.2863893	.2645241	-1.08	0.300	-.8627379	.2899592
watervall~d2	-.7269741	.536239	-1.36	0.200	-1.895339	.4413903
waterva~pgdd	.5709007	.5814833	0.98	0.346	-.6960426	1.837844
waterval~icp	54.18439	100.8791	0.54	0.601	-165.6123	273.9811
waterva~igdd	-124.9721	216.9599	-0.58	0.575	-597.6871	347.7429
_cons	-3905.206	5447.918	-0.72	0.487	-15775.2	7964.787

Batesville, MS

Linear regression

Number of obs	= 22
F(5, 16)	= 1.25
Prob > F	= 0.3333
R-squared	= 0.3607
Root MSE	= 19.472

batesville~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
batesville~i	-5560.661	10941.68	-0.51	0.618	-28755.98	17634.66
batesvil~_cp	-55.12431	69.5226	-0.79	0.439	-202.5056	92.25701
batesvi~_gdd	(dropped)					
batesvill~i2	3280.614	6920.996	0.47	0.642	-11391.24	17952.47
batesvill~p2	-.0291262	.3238844	-0.09	0.929	-.7157305	.6574782
batesvill~d2	(dropped)					
batesvi~pgdd	(dropped)					
batesvil~icp	83.43634	90.12758	0.93	0.368	-107.6256	274.4983
batesvi~igdd	(dropped)					
_cons	2337.927	4320.948	0.54	0.596	-6822.073	11497.93

Yazoo City, MS

Linear regression

Number of obs	= 22
F(9, 12)	= 4.82
Prob > F	= 0.0068
R-squared	= 0.7479
Root MSE	= 15.487

yazoocitym~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
yazoocitym~i	406.4111	9089.379	0.04	0.965	-19397.64	20210.47
yazoo_cp	6.177143	73.10144	0.08	0.934	-153.0972	165.4515
yazoo_gdd	-21.94278	21.07611	-1.04	0.318	-67.86368	23.97811
yazoo_ndvi2	-554.8478	5370.729	-0.10	0.919	-12256.66	11146.97
yazoo_cp2	-.3237326	.4301363	-0.75	0.466	-1.260919	.613454
yazoo_gdd2	.047459	.0584679	0.81	0.433	-.0799317	.1748497
yazoo_cpgdd	.1889315	.3285902	0.57	0.576	-.5270051	.9048681
yazoo_ndvicp	2.625511	82.31787	0.03	0.975	-176.7297	181.9807
yazoo_ndvi~d	21.45542	24.46848	0.88	0.398	-31.85682	74.76766
_cons	91.09072	3905.966	0.02	0.982	-8419.277	8601.459

Angelica, NY

Linear regression

Number of obs	= 22
F(9, 12)	= 483.52
Prob > F	= 0.0000
R-squared	= 0.5440
Root MSE	= 11.85

angelicany~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
angelicany~i	-4647.59	3018.533	-1.54	0.150	-11224.41	1929.229
angelica_cp	41.89273	38.60846	1.09	0.299	-42.22788	126.0133
angelica_gdd	-4.359822	52.74158	-0.08	0.935	-119.2739	110.5542
angelica_n~2	3020.146	1997.72	1.51	0.156	-1332.511	7372.803
angelica_cp2	-.0612981	.3847426	-0.16	0.876	-.8995802	.7769839
angelica_g~2	.0285959	.0446938	0.64	0.534	-.0687836	.1259754
angelica_c~d	-.1262876	.2790127	-0.45	0.659	-.7342041	.4816289
angelica_n~p	-46.45034	49.12434	-0.95	0.363	-153.4831	60.58241
angelica_n~d	5.993336	63.25981	0.09	0.926	-131.838	143.8246
_cons	1844.709	1191.535	1.55	0.148	-751.4232	4440.84

Riverhead, NY

Linear regression

Number of obs	= 22
F(9, 12)	= 0.94
Prob > F	= 0.5294
R-squared	= 0.2043
Root MSE	= 17.183

riverheadn~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
riverheadn~i	148.6135	1841.549	0.08	0.937	-3863.777	4161.004
riverhead_cp	13.4933	17.22172	0.78	0.449	-24.0296	51.0162
riverhe~_gdd	.9892921	1.506402	0.66	0.524	-2.292876	4.27146
riverhead~i2	-303.0554	1767.563	-0.17	0.867	-4154.245	3548.134
riverhead~p2	-.113694	.1560415	-0.73	0.480	-.4536791	.2262912
riverhead~d2	-.0011655	.0020603	-0.57	0.582	-.0056544	.0033234
riverhe~pgdd	-.0603439	.0566284	-1.07	0.308	-.1837266	.0630388
riverhea~icp	-1.569347	37.71838	-0.04	0.967	-83.75064	80.61195
riverhe~igdd	.5115184	2.064293	0.25	0.808	-3.98619	5.009227
_cons	-88.92248	470.3161	-0.19	0.853	-1113.653	935.8083

Fredonia, NY

Linear regression

Number of obs	= 22
F(9, 12)	= 0.40
Prob > F	= 0.9113
R-squared	= 0.2610
Root MSE	= 11.162

fredoniany~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
fredoniany~i	203.144	307.9157	0.66	0.522	-467.7468	874.0347
fredonia_cp	-.0514637	8.877371	-0.01	0.995	-19.39359	19.29067
fredonia_gdd	-.3535607	1.059763	-0.33	0.744	-2.662587	1.955465
fredonia_n~2	-117.1984	272.1489	-0.43	0.674	-710.1599	475.7632
fredonia_cp2	.044514	.1547623	0.29	0.779	-.2926842	.3817121
fredonia_g~2	.0007652	.0031563	0.24	0.813	-.0061118	.0076422
fredonia_c~d	.0327744	.0540759	0.61	0.556	-.0850469	.1505956
fredonia_n~p	-5.757881	8.394044	-0.69	0.506	-24.04693	12.53117
fredonia_n~d	-.3029045	1.165247	-0.26	0.799	-2.84176	2.235951
_cons	61.40246	134.1585	0.46	0.655	-230.9037	353.7086

Du Quoin, IL

Linear regression

Number of obs =	22
F(9, 12) =	0.40
Prob > F =	0.9098
R-squared =	0.6282
Root MSE =	16.295

duquoinil_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
duquoinil_~i	-2174.452	3561.786	-0.61	0.553	-9934.917	5586.013
duquoin_cp	-69.10853	66.07885	-1.05	0.316	-213.082	74.86492
duquoin_gdd	-11.17822	22.90449	-0.49	0.634	-61.08283	38.72638
duquoin_nd~2	707.1143	1813.931	0.39	0.703	-3245.102	4659.33
duquoin_cp2	.3351413	.2946221	1.14	0.278	-.3067851	.9770677
duquoin_gdd2	.0019928	.0249811	0.08	0.938	-.0524363	.0564219
duquoin_cp~d	.0322938	.1217361	0.27	0.795	-.2329465	.2975341
duquoin_nd~p	82.61601	79.90391	1.03	0.322	-91.47964	256.7117
duquoin_nd~d	14.63697	29.59524	0.49	0.630	-49.84553	79.11946
_cons	1343.449	1767.785	0.76	0.462	-2508.223	5195.122

Minonk, IL

Linear regression

Number of obs =	22
F(9, 12) =	2.27
Prob > F =	0.0930
R-squared =	0.8160
Root MSE =	17.274

minonkil_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
minonkil_m~i	8618.975	12483.57	0.69	0.503	-18580.39	35818.34
minonk_cp	-47.37575	133.5898	-0.35	0.729	-338.443	243.6915
minonk_gdd	-57.58734	295935.3	-0.00	1.000	-644845.2	644730
minonk_ndvi2	-5738.639	8592.355	-0.67	0.517	-24459.77	12982.49
minonk_cp2	-.9986846	.5794672	-1.72	0.110	-2.261235	.2638661
minonk_gdd2	-.5143097	6112.681	-0.00	1.000	-13318.9	13317.87
minonk_cpgdd	.6191451	2801.624	0.00	1.000	-6103.595	6104.833
minonk_ndv~p	88.98763	167.4952	0.53	0.605	-275.9531	453.9283
minonk_ndv~d	65.08113	358447.7	0.00	1.000	-780925.4	781055.6
_cons	-3224.071	4446.585	-0.73	0.482	-12912.35	6464.205

Ardmore, SD

Linear regression

Number of obs =	22
F(9, 12) =	4.71
Prob > F =	0.0075
R-squared =	0.7006
Root MSE =	11.872

ardmoresd_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
ardmoresd_~i	603.0854	1018.867	0.59	0.565	-1616.835	2823.006
ardmore_cp	24.73	27.42167	0.90	0.385	-35.01668	84.47669
ardmore_gdd	-2.312138	2.337933	-0.99	0.342	-7.406056	2.781781
ardmore_nd~2	-452.4939	777.2393	-0.58	0.571	-2145.953	1240.965
ardmore_cp2	-.4442978	.5012455	-0.89	0.393	-1.536418	.6478223
ardmore_gdd2	.0048511	.0040597	1.19	0.255	-.0039942	.0136963
ardmore_cp~d	.0232084	.083084	0.28	0.785	-.157816	.2042328
ardmore_nd~p	-27.90225	27.70333	-1.01	0.334	-88.26261	32.45811
ardmore_nd~d	2.556933	2.616229	0.98	0.348	-3.143339	8.257206
_cons	-109.2068	401.5431	-0.27	0.790	-984.094	765.6804

Windsor, IL

Linear regression

Number of obs	= 22
F(9, 12)	= 3.11
Prob > F	= 0.0354
R-squared	= 0.7346
Root MSE	= 16.221

windsoril_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
windsoril_~i	2518.301	2868.266	0.88	0.397	-3731.114	8767.715
windsor_cp	9.522434	48.91393	0.19	0.849	-97.05187	116.0967
windsor_gdd	-.5731833	.9884681	-0.58	0.573	-2.72687	1.580504
windsor_nd~2	-1328.247	2101.81	-0.63	0.539	-5907.697	3251.202
windsor_cp2	.3865585	.6925499	0.56	0.587	-1.122378	1.895495
windsor_gdd2	.0001308	.000685	0.19	0.852	-.0013617	.0016232
windsor_cp~d	-.0127345	.0291876	-0.44	0.670	-.0763288	.0508597
windsor_nd~p	-22.41855	60.28347	-0.37	0.716	-153.7649	108.9278
windsor_nd~d	.6550718	1.121387	0.58	0.570	-1.78822	3.098363
_cons	-949.006	941.9511	-1.01	0.334	-3001.341	1103.329

White Hall, IL

Linear regression

Number of obs	= 22
F(7, 13)	= .
Prob > F	= .
R-squared	= 0.6901
Root MSE	= 15.926

whitehalli~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
whitehalli~i	5119.446	2377.349	2.15	0.051	-16.50501	10255.4
whitehall_cp	-42.98011	26.71576	-1.61	0.132	-100.696	14.73578
whiteha~_gdd	-77.73002	84.18356	-0.92	0.373	-259.5975	104.1375
whitehall~i2	-3757.07	1774.348	-2.12	0.054	-7590.315	76.17475
whitehall~p2	-.4055809	.240269	-1.69	0.115	-.9246504	.1134887
whitehall~d2	.0516524	.0561728	0.92	0.375	-.0697016	.1730064
whiteha~pgdd	4.52806	4.904035	0.92	0.373	-6.066464	15.12258
whitehal~icp	66.74442	36.70116	1.82	0.092	-12.54362	146.0325
whiteha~igdd	(dropped)					
_cons	-1609.752	782.9557	-2.06	0.060	-3301.225	81.72059

Beaverdam, KY

Linear regression

Number of obs	= 22
F(9, 12)	= 0.70
Prob > F	= 0.6971
R-squared	= 0.5033
Root MSE	= 20.473

beaverdamk~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
beaverdamk~i	4264.86	27806.49	0.15	0.881	-56320.28	64849.99
beaverdam_cp	51.54705	238.2483	0.22	0.832	-467.5513	570.6454
beaverd~_gdd	.1425247	7.953291	0.02	0.986	-17.18621	17.47126
beaverdam~i2	-2064.914	19493.76	-0.11	0.917	-44538.16	40408.34
beaverdam~p2	-.3004933	1.260657	-0.24	0.816	-3.047228	2.446241
beaverdam~d2	-.0005008	.0021397	-0.23	0.819	-.0051629	.0041612
beaverd~pgdd	.0243874	.1253571	0.19	0.849	-.2487423	.297517
beaverda~icp	-69.44028	252.2512	-0.28	0.788	-619.0485	480.168
beaverd~igdd	-.351043	8.530373	-0.04	0.968	-18.93713	18.23504
_cons	-1860.97	9869.187	-0.19	0.854	-23364.08	19642.14

Providence, KY

Linear regression

Number of obs =	22
F(9, 12) =	3.63
Prob > F =	0.0206
R-squared =	0.6771
Root MSE =	16.521

providence~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
providence~i	-2748.798	17131.45	-0.16	0.875	-40075.03	34577.43
providence~p	121.3655	143.1333	0.85	0.413	-190.4952	433.2262
providn~_gdd	-.9209739	2.173371	-0.42	0.679	-5.656343	3.814395
providnec~i2	2986.441	11726.35	0.25	0.803	-22563.09	28535.97
providnec~p2	.0580032	.5179406	0.11	0.913	-1.070492	1.186499
providnec~d2	-.0000187	.0001252	-0.15	0.884	-.0002915	.0002541
providn~pgdd	-.0052473	.0112088	-0.47	0.648	-.0296691	.0191746
providnece~p	-159.3928	201.817	-0.79	0.445	-599.1143	280.3287
providn~igdd	1.310975	2.869223	0.46	0.656	-4.940525	7.562475
_cons	470.4625	6518.562	0.07	0.944	-13732.26	14673.19

Farmville, VA

Linear regression

Number of obs =	22
F(9, 12) =	1.43
Prob > F =	0.2747
R-squared =	0.5080
Root MSE =	28.946

farmvillev~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
farmvillev~i	11081.47	24554.36	0.45	0.660	-42417.88	64580.81
farmville_cp	-320.0663	216.1174	-1.48	0.164	-790.9456	150.813
farmvil~_gdd	-4.270826	3.905717	-1.09	0.296	-12.78065	4.238999
farmville~i2	-10796.19	16836.24	-0.64	0.533	-47479.2	25886.83
farmville~p2	.0726185	.8179263	0.09	0.931	-1.70949	1.854727
farmville~d2	-.001253	.0013446	-0.93	0.370	-.0041827	.0016768
farmvil~pgdd	-.0467279	.0602808	-0.78	0.453	-.1780686	.0846127
farmvill~icp	404.2374	266.5321	1.52	0.155	-176.4861	984.9609
farmvil~igdd	6.563443	5.59653	1.17	0.264	-5.630349	18.75723
_cons	-1947.377	9089.506	-0.21	0.834	-21751.71	17856.96

Heppner, OR

Linear regression

Number of obs =	22
F(9, 12) =	0.20
Prob > F =	0.9900
R-squared =	0.2178
Root MSE =	27.669

heppneror_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
heppneror_~i	-1254.366	4258.113	-0.29	0.773	-10532	8023.266
heppner_cp	2.376535	200.7005	0.01	0.991	-434.9123	439.6654
heppner_gdd	1.41442	24.66084	0.06	0.955	-52.31693	55.14577
heppner_nd~2	1817.604	5590.579	0.33	0.751	-10363.22	13998.43
heppner_cp2	4.171648	12.03211	0.35	0.735	-22.04406	30.38735
heppner_gdd2	-.0068911	.1111649	-0.06	0.952	-.2490986	.2353164
heppner_cp~d	.2322885	1.461083	0.16	0.876	-2.951138	3.415715
heppner_nd~p	-98.74451	352.8957	-0.28	0.784	-867.6382	670.1491
heppner_nd~d	-6.064508	52.17412	-0.12	0.909	-119.7422	107.6131
_cons	476.6394	890.027	0.54	0.602	-1462.563	2415.842

Eltopia, WA

Linear regression

Number of obs	= 21
F(9, 11)	= 1.28
Prob > F	= 0.3455
R-squared	= 0.6910
Root MSE	= 7.7538

eltopiawa_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
eltopiawa_~i	2506.975	5218.334	0.48	0.640	-8978.5	13992.45
eltopia_cp	-281.7797	289.4438	-0.97	0.351	-918.8413	355.2819
eltopia_gdd	1.029907	3.371223	0.31	0.766	-6.390104	8.449919
eltopia_nd~2	-2290.043	4002.23	-0.57	0.579	-11098.89	6518.806
eltopia_cp2	-12.19647	11.03337	-1.11	0.293	-36.48075	12.08781
eltopia_gdd2	.0011412	.0031933	0.36	0.728	-.0058871	.0081695
eltopia_cp~d	.0109702	.1925721	0.06	0.956	-.4128782	.4348186
eltopia_nd~p	471.4662	450.5588	1.05	0.318	-520.2071	1463.14
eltopia_nd~d	-1.621549	4.935082	-0.33	0.749	-12.48359	9.240495
_cons	-506.5165	1716.172	-0.30	0.773	-4283.785	3270.752

Menomonie, WI

Linear regression

Number of obs	= 22
F(9, 12)	= 2.90
Prob > F	= 0.0445
R-squared	= 0.6067
Root MSE	= 15.984

menomoniew~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
menomoniew~i	9357.289	13582.73	0.69	0.504	-20236.93	38951.51
menomonie_cp	-7.212612	157.999	-0.05	0.964	-351.4629	337.0377
menomon~_gdd	-1.734742	4.536782	-0.38	0.709	-11.61954	8.150057
menomonie~i2	-6221.92	9096.592	-0.68	0.507	-26041.69	13597.85
menomonie~p2	.0254062	.9802063	0.03	0.980	-2.11028	2.161092
menomonie~d2	.0005185	.0008857	0.59	0.569	-.0014113	.0024484
menomon~pgdd	.0550166	.0628429	0.88	0.399	-.0819063	.1919395
menomoni~icp	1.639145	172.359	0.01	0.993	-373.8988	377.177
menomon~igdd	1.082636	5.920179	0.18	0.858	-11.81633	13.9816
_cons	-3311.216	5124.187	-0.65	0.530	-14475.86	7853.429

Arlington, WI

Linear regression

Number of obs	= 22
F(9, 12)	= 1.35
Prob > F	= 0.3095
R-squared	= 0.6555
Root MSE	= 15.59

arlingtonw~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
arlingtonw~i	2408.849	6390.878	0.38	0.713	-11515.68	16333.38
arlington_cp	12.05749	136.8279	0.09	0.931	-286.0649	310.1799
arlingt~_gdd	1.000102	3.869617	0.26	0.800	-7.431069	9.431273
arlington~i2	-1491.056	4464.927	-0.33	0.744	-11219.3	8237.184
arlington~p2	-.365963	.9467423	-0.39	0.706	-2.428737	1.696811
arlington~d2	-.0000782	.0019369	-0.04	0.968	-.0042982	.0041419
arlingt~pgdd	-.0035246	.1052383	-0.03	0.974	-.2328191	.2257698
arlingto~icp	-.5320992	137.5484	-0.00	0.997	-300.2243	299.1601
arlingt~igdd	-1.409296	3.896153	-0.36	0.724	-9.898283	7.079692
_cons	-919.0616	2524.388	-0.36	0.722	-6419.231	4581.107

Sellingsgrove, PA

```
Linear regression                                      Number of obs =      22
                                                       F(  5,    16) =    2.27
                                                       Prob > F      =  0.0970
                                                       R-squared     =  0.6052
                                                       Root MSE      =  16.564

------------------------------------------------------------------------------
             |             Robust HC3
sellingsgr~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
selingsgro~i |   7770.009   18983.94     0.41   0.688    -32474.14    48014.16
selingsgro~p |   15.83092   80.39748     0.20   0.846    -154.6041     186.266
selling~_gdd |  (dropped)
sellingsg~i2 |   -5061.72   12010.67    -0.42   0.679     -30523.2    20399.76
sellingsg~p2 |  -.7698302   .4437353    -1.73   0.102    -1.710507    .1708467
sellingsg~d2 |  (dropped)
selling~pgdd |  (dropped)
sellingsgr~p |    12.7943   104.6399     0.12   0.904    -209.0324     234.621
selling~igdd |  (dropped)
       _cons |  -3085.179   7584.319    -0.41   0.690    -19163.22    12992.86
------------------------------------------------------------------------------
```

Montrose, PA

```
Linear regression                                      Number of obs =      22
                                                       F(  6,    15) =   18.20
                                                       Prob > F      =  0.0000
                                                       R-squared     =  0.4977
                                                       Root MSE      =  12.193

------------------------------------------------------------------------------
             |             Robust HC3
montrosepa~s |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
montrosepa~i |  -4715.934   3702.487    -1.27   0.222     -12607.6    3175.729
 montrose_cp |   -6.24172    27.2698    -0.23   0.822    -64.36591    51.88247
montrose_gdd |  (dropped)
montrose_n~2 |   2576.101   2012.443     1.28   0.220     -1713.32    6865.522
montrose_cp2 |  -.1568907    .235776    -0.67   0.516    -.6594354     .345654
montrose_g~2 |  (dropped)
montrose_c~d |  -.3574746   .0875493    -4.08   0.001    -.5440816   -.1708676
montrose_n~p |   14.26023   25.26331     0.56   0.581    -39.58724    68.10771
montrose_n~d |  (dropped)
       _cons |   2189.699   1722.097     1.27   0.223    -1480.865    5860.263
------------------------------------------------------------------------------
```

Regression Results for Soy Yields

Algona, IA

Linear regression

Number of obs	= 22
F(9, 12)	= 0.93
Prob > F	= 0.5363
R-squared	= 0.6578
Root MSE	= 4.6957

algonaia_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
algonaia_m~i	-1814.511	7047.873	-0.26	0.801	-17170.51	13541.49
algona_cp	-.7250928	41.22457	-0.02	0.986	-90.54572	89.09553
algona_gdd	-.9320641	1.537436	-0.61	0.556	-4.28185	2.417722
alongona_m~2	1092.608	4268.33	0.26	0.802	-8207.284	10392.5
algona_cp2	-.0918152	.1209298	-0.76	0.462	-.3552986	.1716682
algona_gdd2	.0003237	.0006306	0.51	0.617	-.0010502	.0016977
algona_cpgdd	.0040251	.0164963	0.24	0.811	-.0319171	.0399674
algona_ndv~p	3.935387	49.04054	0.08	0.937	-102.9148	110.7855
algona_ndv~d	.9781256	1.486274	0.66	0.523	-2.260187	4.216438
_cons	778.6642	2941.46	0.26	0.796	-5630.227	7187.556

Rockrapids, IA

Linear regression

Number of obs	= 22
F(5, 16)	= 6.02
Prob > F	= 0.0026
R-squared	= 0.6862
Root MSE	= 4.2614

rockrapids~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
rockrapids~i	1058.166	4574.038	0.23	0.820	-8638.361	10754.69
rockrapi~_cp	9.33645	10.57743	0.88	0.390	-13.08669	31.75959
rockrap~_gdd	(dropped)					
rockrapid~i2	-459.4974	2618.063	-0.18	0.863	-6009.544	5090.549
rockrapid~p2	-.0414785	.1268377	-0.33	0.748	-.3103625	.2274054
rockrapid~d2	(dropped)					
rockrap~pgdd	(dropped)					
rockrapi~icp	-9.931236	11.95325	-0.83	0.418	-35.27099	15.40852
rockrap~igdd	(dropped)					
_cons	-529.3868	1984.105	-0.27	0.793	-4735.502	3676.729

Saluda, SC

Linear regression

Number of obs	= 21
F(6, 12)	= .
Prob > F	= .
R-squared	= 0.7826
Root MSE	= 2.3972

saluda_yie~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
saludasc_m~i	-10648.65	2553.056	-4.17	0.001	-16211.28	-5086.022
saluda_cp	-31.69274	10.51508	-3.01	0.011	-54.60312	-8.782355
saluda_gdd	4.832407	1.600502	3.02	0.011	1.345213	8.319602
saluda_ndvi2	6576.267	1568.007	4.19	0.001	3159.873	9992.661
saluda_cp2	.0368131	.0526719	0.70	0.498	-.0779492	.1515754
saluda_gdd2	-.1174383	.0449632	-2.61	0.023	-.2154047	-.019472
saluda_cpgdd	-.1642622	.1284485	-1.28	0.225	-.4441275	.115603
saluda_ndv~p	40.50446	12.16288	3.33	0.006	14.00383	67.00509
saluda_ndv~d	(dropped)					
_cons	4318.534	1041.499	4.15	0.001	2049.302	6587.766

Dublin, GA

Linear regression

Number of obs	= 22
F(9, 12)	= 57.37
Prob > F	= 0.0000
R-squared	= 0.6722
Root MSE	= 5.0979

dublinga_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
dublinga_m~i	6816.666	5491.27	1.24	0.238	-5147.783	18781.11
dublin_cp	31.318	23.70952	1.32	0.211	-20.3406	82.97659
dublin_gdd	490.4518	248.7946	1.97	0.072	-51.62516	1032.529
dublin_ndvi2	-4799.059	4175.444	-1.15	0.273	-13896.57	4298.452
dublin_cp2	.1604798	.1420927	1.13	0.281	-.1491136	.4700732
dublin_gdd2	-.9177348	.4367912	-2.10	0.057	-1.869421	.0339514
dublin_cpgdd	.6920435	.4580961	1.51	0.157	-.3060622	1.690149
dublin_ndv~p	-51.01865	38.77182	-1.32	0.213	-135.4952	33.4579
dublin_ndv~d	-761.5912	387.4229	-1.97	0.073	-1605.713	82.53072
_cons	-2378.104	1817.023	-1.31	0.215	-6337.058	1580.85

Booneville, MS

Linear regression

Number of obs	= 22
F(6, 15)	= 0.71
Prob > F	= 0.6477
R-squared	= 0.1725
Root MSE	= 5.5506

booneville~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
booneville~i	266.7389	1459.081	0.18	0.857	-2843.218	3376.696
boonevil~_cp	-.1435841	5.550685	-0.03	0.980	-11.97459	11.68742
boonevi~_gdd	(dropped)					
boonevill~i2	-164.7805	905.3378	-0.18	0.858	-2094.462	1764.901
boonevill~p2	-.0140568	.0394153	-0.36	0.726	-.0980685	.069955
boonevill~d2	(dropped)					
boonevi~pgdd	-.0459089	.0581607	-0.79	0.442	-.1698754	.0780577
boonevil~icp	1.176442	7.200105	0.16	0.872	-14.17022	16.5231
boonevi~igdd	(dropped)					
_cons	-93.68471	586.8226	-0.16	0.875	-1344.467	1157.098

Water Valley, MS

Linear regression

Number of obs	=	21
F(9, 11)	=	3.21
Prob > F	=	0.0361
R-squared	=	0.4813
Root MSE	=	5.169

watervalle~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
watervalle~i	-269.3815	3079.95	-0.09	0.932	-7048.306	6509.543
waterval~_cp	-5.802061	15.01932	-0.39	0.707	-38.85937	27.25524
waterva~_gdd	-14.12001	47.64336	-0.30	0.772	-118.9823	90.74232
watervall~i2	-14.14096	1776.318	-0.01	0.994	-3923.792	3895.51
watervall~p2	-.0406434	.0723927	-0.56	0.586	-.1999787	.1186919
watervall~d2	-.0608461	.3821662	-0.16	0.876	-.9019882	.780296
waterva~pgdd	.0706527	.3314083	0.21	0.835	-.6587721	.8000776
waterval~icp	9.098075	17.17305	0.53	0.607	-28.69955	46.8957
waterva~igdd	19.31529	56.29443	0.34	0.738	-104.5879	143.2185
_cons	219.3205	1352.257	0.16	0.874	-2756.977	3195.618

Batesville, MS

Linear regression

Number of obs	=	22
F(5, 16)	=	0.75
Prob > F	=	0.5997
R-squared	=	0.2051
Root MSE	=	5.4163

batesville~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
batesville~i	-1045.427	3853.214	-0.27	0.790	-9213.877	7123.022
batesvil~_cp	-17.19772	24.11647	-0.71	0.486	-68.32236	33.92692
batesvi~_gdd	(dropped)					
batesvill~i2	503.1346	2491.572	0.20	0.843	-4778.762	5785.031
batesvill~p2	.0210067	.112238	0.19	0.854	-.2169272	.2589405
batesvill~d2	(dropped)					
batesvi~pgdd	(dropped)					
batesvil~icp	24.06394	31.24667	0.77	0.452	-42.17604	90.30391
batesvi~igdd	(dropped)					
_cons	508.6678	1502.459	0.34	0.739	-2676.402	3693.738

Yazoo City, MS

Linear regression

Number of obs	=	22
F(9, 12)	=	1.62
Prob > F	=	0.2148
R-squared	=	0.3863
Root MSE	=	6.6943

yazoocitym~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
yazoocitym~i	2961.251	3100.353	0.96	0.358	-3793.837	9716.34
yazoo_cp	26.48203	30.31091	0.87	0.399	-39.55978	92.52383
yazoo_gdd	.4270464	7.059756	0.06	0.953	-14.95484	15.80893
yazoo_ndvi2	-1596.547	1750.351	-0.91	0.380	-5410.235	2217.14
yazoo_cp2	-.1736957	.2061543	-0.84	0.416	-.6228672	.2754759
yazoo_gdd2	.0047357	.0091654	0.52	0.615	-.015234	.0247054
yazoo_cpgdd	-.0454359	.1386052	-0.33	0.749	-.3474307	.2565589
yazoo_ndvicp	-26.57372	33.68391	-0.79	0.445	-99.96465	46.81721
yazoo_ndvi~d	-.3119233	8.197144	-0.04	0.970	-18.17197	17.54812
_cons	-1352.838	1383.529	-0.98	0.347	-4367.289	1661.613

Du Quoin, IL

Linear regression

Number of obs	22
F(9, 12)	0.76
Prob > F	0.6505
R-squared	0.6216
Root MSE	4.2006

duquoinil_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
duquoinil_~i	-713.8856	702.4978	-1.02	0.330	-2244.497	816.7255
duquoin_cp	-18.26719	11.44788	-1.60	0.137	-43.20998	6.675602
duquoin_gdd	-3.011217	4.246012	-0.71	0.492	-12.26248	6.240049
duquoin_nd~2	257.6696	369.3275	0.70	0.499	-547.0259	1062.365
duquoin_cp2	.0727957	.0576295	1.26	0.231	-.0527683	.1983597
duquoin_gdd2	-.0025192	.0060473	-0.42	0.684	-.015695	.0106566
duquoin_cp~d	-.0005483	.0289758	-0.02	0.985	-.0636811	.0625845
duquoin_nd~p	22.70392	13.63845	1.66	0.122	-7.011703	52.41954
duquoin_nd~d	4.333074	5.443689	0.80	0.442	-7.527706	16.19385
_cons	418.158	338.3439	1.24	0.240	-319.0299	1155.346

Minonk, IL

Linear regression

Number of obs	22
F(9, 12)	0.88
Prob > F	0.5649
R-squared	0.7343
Root MSE	4.4289

minonkil_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
minonkil_m~i	670.8499	2298.043	0.29	0.775	-4336.157	5677.856
minonk_cp	8.917755	25.18459	0.35	0.729	-45.95475	63.79026
minonk_gdd	-203.8351	113101.6	-0.00	0.999	-246631	246223.3
minonk_ndvi2	-396.3504	1535.588	-0.26	0.801	-3742.11	2949.409
minonk_cp2	-.1730022	.1221612	-1.42	0.182	-.4391687	.0931642
minonk_gdd2	4.135079	2336.167	0.00	0.999	-5085.935	5094.205
minonk_cpgdd	-3.840381	1070.732	-0.00	0.997	-2336.765	2329.085
minonk_ndv~p	-4.053321	28.95428	-0.14	0.891	-67.13929	59.03264
minonk_ndv~d	278.4009	136992.8	0.00	0.998	-298203.2	298760
_cons	-276.0849	836.5011	-0.33	0.747	-2098.664	1546.494

Windsor, IL

Linear regression

Number of obs	22
F(9, 12)	4.84
Prob > F	0.0067
R-squared	0.6746
Root MSE	4.3463

windsoril_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
windsoril_~i	515.2734	724.6016	0.71	0.491	-1063.498	2094.045
windsor_cp	4.313011	15.71782	0.27	0.788	-29.93318	38.5592
windsor_gdd	-.0790699	.3274609	-0.24	0.813	-.7925459	.6344062
windsor_nd~2	-244.5751	557.5881	-0.44	0.669	-1459.455	970.305
windsor_cp2	.0507554	.2178401	0.23	0.820	-.4238775	.5253882
windsor_gdd2	.0000588	.0002837	0.21	0.839	-.0005595	.000677
windsor_cp~d	-.0021712	.012079	-0.18	0.860	-.0284891	.0241468
windsor_nd~p	-6.399578	18.31468	-0.35	0.733	-46.30383	33.50468
windsor_nd~d	.0670142	.3631861	0.18	0.857	-.7243004	.8583289
_cons	-207.2024	245.2546	-0.84	0.415	-741.5662	327.1614

White Hall, IL

Linear regression

Number of obs =	22
F(7, 13) =	.
Prob > F =	.
R-squared =	0.6650
Root MSE =	4.4317

whitehalli~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
whitehalli~i	878.775	1412.078	0.62	0.544	-2171.835	3929.385
whitehall_cp	-4.779675	9.90794	-0.48	0.638	-26.18448	16.62513
whiteha~_gdd	-20.30925	21.71641	-0.94	0.367	-67.22471	26.6062
whitehall~i2	-634.1398	963.7031	-0.66	0.522	-2716.094	1447.814
whitehall~p2	-.0540039	.1078244	-0.50	0.625	-.2869444	.1789366
whitehall~d2	.0135137	.0144931	0.93	0.368	-.0177968	.0448241
whiteha~pgdd	1.182473	1.264952	0.93	0.367	-1.55029	3.915235
whitehal~icp	8.22195	14.08246	0.58	0.569	-22.20135	38.64525
whiteha~igdd	(dropped)					
_cons	-267.4864	520.5278	-0.51	0.616	-1392.018	857.0455

Beaverdam, KY

Linear regression

Number of obs =	22
F(9, 12) =	0.86
Prob > F =	0.5801
R-squared =	0.3695
Root MSE =	5.7045

beaverdamk~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
beaverdamk~i	348.2916	6138.431	0.06	0.956	-13026.2	13722.78
beaverdam_cp	9.022764	51.30345	0.18	0.863	-102.7578	120.8034
beaverd~_gdd	-.1677813	2.188623	-0.08	0.940	-4.936381	4.600819
beaverdam~i2	-137.9155	4597.251	-0.03	0.977	-10154.47	9878.635
beaverdam~p2	-.0314492	.2644391	-0.12	0.907	-.6076124	.5447141
beaverdam~d2	-.0000743	.0006103	-0.12	0.905	-.001404	.0012554
beaverd~pgdd	.0050291	.0341503	0.15	0.885	-.0693781	.0794364
beaverda~icp	-12.81797	50.81014	-0.25	0.805	-123.5237	97.88782
beaverd~igdd	.1739356	2.223353	0.08	0.939	-4.670334	5.018206
_cons	-136.1653	1945.236	-0.07	0.945	-4374.47	4102.139

Providence, KY

Linear regression

Number of obs =	22
F(9, 12) =	1.55
Prob > F =	0.2356
R-squared =	0.5378
Root MSE =	5.6177

providence~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
providence~i	990.681	6629.011	0.15	0.884	-13452.69	15434.05
providence~p	32.27764	60.82382	0.53	0.605	-100.2461	164.8014
providn~_gdd	-.1365521	.8512542	-0.16	0.875	-1.991276	1.718172
providnec~i2	-302.3633	4577.627	-0.07	0.948	-10276.16	9671.43
providnec~p2	.0466135	.1637737	0.28	0.781	-.3102188	.4034457
providnec~d2	.0000157	.000043	0.37	0.721	-.000078	.0001095
providn~pgdd	.0016524	.0033279	0.50	0.628	-.0055985	.0089033
providnece~p	-45.22737	85.21806	-0.53	0.605	-230.9016	140.4468
providn~igdd	.1297933	1.126343	0.12	0.910	-2.324297	2.583884
_cons	-520.7356	2517.739	-0.21	0.840	-6006.418	4964.947

Farmville, VA

Linear regression

Number of obs	= 9
F(5, 0)	= .
Prob > F	= .
R-squared	= 1.0000
Root MSE	= 0

farmvillev~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
farmvillev~i	-6873.861	3006.939	-2.29	.	.	.
farmville_cp	-194.4727	91.41609	-2.13	.	.	.
farmvil~_gdd	-9.836454	4.146786	-2.37	.	.	.
farmville~i2	(dropped)					
farmville~p2	1.416668	.5353095	2.65	.	.	.
farmville~d2	-.0001984	.0001258	-1.58	.	.	.
farmvil~pgdd	.0587549	.0187169	3.14	.	.	.
farmvill~icp	176.0518	88.95232	1.98	.	.	.
farmvil~igdd	11.54697	4.973281	2.32	.	.	.
_cons	5964.722	2572.438	2.32	.	.	.

Menomonie, WI

Linear regression

Number of obs	= 22
F(9, 12)	= 1.99
Prob > F	= 0.1328
R-squared	= 0.4080
Root MSE	= 7.0307

menomoniew~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
menomoniew~i	-5545.201	5578.198	-0.99	0.340	-17699.05	6608.649
menomonie_cp	1.3357	50.21382	0.03	0.979	-108.0708	110.7422
menomon~_gdd	.4125578	1.451487	0.28	0.781	-2.74996	3.575076
menomonie~i2	3518.649	3664.462	0.96	0.356	-4465.528	11502.83
menomonie~p2	-.2518738	.3694623	-0.68	0.508	-1.056863	.5531154
menomonie~d2	-.000407	.0004183	-0.97	0.350	-.0013183	.0005044
menomon~pgdd	-.0158651	.0217627	-0.73	0.480	-.0632819	.0315517
menomoni~icp	11.22641	51.77995	0.22	0.832	-101.5924	124.0452
menomon~igdd	-.0684475	1.709388	-0.04	0.969	-3.792885	3.65599
_cons	2115.806	2135.027	0.99	0.341	-2536.018	6767.629

Arlington, WI

Linear regression

Number of obs	= 22
F(9, 12)	= 0.50
Prob > F	= 0.8463
R-squared	= 0.3652
Root MSE	= 6.5359

arlingtonw~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
arlingtonw~i	-1271.271	3540.671	-0.36	0.726	-8985.731	6443.189
arlington_cp	-8.880773	42.10382	-0.21	0.836	-100.6171	82.85557
arlingt~_gdd	-.484403	1.945659	-0.25	0.808	-4.723629	3.754823
arlington~i2	654.0308	2208.43	0.30	0.772	-4157.725	5465.787
arlington~p2	-.081256	.2799215	-0.29	0.777	-.6911525	.5286405
arlington~d2	.0001127	.0009327	0.12	0.906	-.0019195	.0021449
arlingt~pgdd	.0021839	.0426298	0.05	0.960	-.0906984	.0950662
arlingto~icp	14.4348	41.98388	0.34	0.737	-77.04022	105.9098
arlingt~igdd	.5167096	2.033633	0.25	0.804	-3.914197	4.947616
_cons	619.9949	1490.736	0.42	0.685	-2628.039	3868.029

Sellinggrove, PA

Linear regression

Number of obs	21
F(5, 15)	0.93
Prob > F	0.4916
R-squared	0.2336
Root MSE	6.0537

sellingsgr~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
selingsgro~i	1404.441	3819.156	0.37	0.718	-6735.898	9544.779
selingsgro~p	9.932671	19.36688	0.51	0.616	-31.34686	51.2122
selling~_gdd	(dropped)					
sellingsg~i2	-824.2485	2495.248	-0.33	0.746	-6142.744	4494.247
sellingsg~p2	-.0234761	.1513875	-0.16	0.879	-.3461508	.2991987
sellingsg~d2	(dropped)					
selling~pgdd	(dropped)					
sellingsgr~p	-10.97639	24.10172	-0.46	0.655	-62.34799	40.39522
selling~igdd	(dropped)					
_cons	-574.0845	1481.091	-0.39	0.704	-3730.956	2582.787

Regression results for Wheat Yields

Saluda, SC

Linear regression

Number of obs	22
F(7, 13)	.
Prob > F	.
R-squared	0.5391
Root MSE	4.9686

saluda_yie~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
saludasc_m~i	301.3616	6845.909	0.04	0.966	-14488.33	15091.05
saluda_cp	13.54305	15.96442	0.85	0.412	-20.94599	48.03209
saluda_gdd	2.489201	3.610653	0.69	0.503	-5.311139	10.28954
saluda_ndvi2	-53.42181	4650.756	-0.01	0.991	-10100.77	9993.925
saluda_cp2	-.0464149	.085229	-0.54	0.595	-.2305409	.1377112
saluda_gdd2	-.0226086	.1375451	-0.16	0.872	-.3197568	.2745395
saluda_cpgdd	-.1606883	.3117562	-0.52	0.615	-.8341968	.5128201
saluda_ndv~p	-15.24993	21.36448	-0.71	0.488	-61.40508	30.90522
saluda_ndv~d	(dropped)					
_cons	-180.4933	2513.745	-0.07	0.944	-5611.108	5250.122

Dublin, GA

Linear regression

Number of obs	=	22
F(9, 12)	=	99.17
Prob > F	=	0.0000
R-squared	=	0.4726
Root MSE	=	8.7332

dublinga_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
dublinga_m~i	2691.782	10503.13	0.26	0.802	-20192.57	25576.14
dublin_cp	19.03704	42.81539	0.44	0.664	-74.24968	112.3238
dublin_gdd	-332.8699	406.2263	-0.82	0.429	-1217.961	552.2212
dublin_ndvi2	-1930.572	8175.062	-0.24	0.817	-19742.5	15881.36
dublin_cp2	.0391457	.5207775	0.08	0.941	-1.095531	1.173822
dublin_gdd2	1.277257	.7956326	1.61	0.134	-.4562773	3.010792
dublin_cpgdd	-.9521408	.9779746	-0.97	0.349	-3.082964	1.178683
dublin_ndv~p	-30.00433	74.32729	-0.40	0.694	-191.9496	131.9409
dublin_ndv~d	510.6074	635.1212	0.80	0.437	-873.2028	1894.418
_cons	-888.076	3399.29	-0.26	0.798	-8294.493	6518.341

Booneville, MS

Linear regression

Number of obs	=	12
F(5, 6)	=	0.49
Prob > F	=	0.7761
R-squared	=	0.8222
Root MSE	=	4.0751

booneville~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
booneville~i	-2094.375	5193.735	-0.40	0.701	-14802.99	10614.24
boonevil~_cp	-9.280433	29.77957	-0.31	0.766	-82.14842	63.58756
boonevi~_gdd	(dropped)					
boonevill~i2	1287.119	3307.583	0.39	0.711	-6806.246	9380.483
boonevill~p2	-.0261649	.2096229	-0.12	0.905	-.5390937	.4867639
boonevill~d2	(dropped)					
boonevi~pgdd	(dropped)					
boonevil~icp	13.57053	34.14473	0.40	0.705	-69.97861	97.11967
boonevi~igdd	(dropped)					
_cons	870.1062	2038.994	0.43	0.684	-4119.133	5859.345

Batesville, MS

Linear regression

Number of obs	=	22
F(5, 16)	=	0.92
Prob > F	=	0.4910
R-squared	=	0.3107
Root MSE	=	8.0366

batesville~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
batesville~i	-3340.344	5195.109	-0.64	0.529	-14353.48	7672.794
batesvil~_cp	-24.41902	32.51311	-0.75	0.464	-93.34374	44.5057
batesvi~_gdd	(dropped)					
batesvill~i2	2174.003	3390.088	0.64	0.530	-5012.661	9360.668
batesvill~p2	.1654422	.1431172	1.16	0.265	-.1379528	.4688372
batesvill~d2	(dropped)					
batesvi~pgdd	(dropped)					
batesvil~icp	26.98684	41.96313	0.64	0.529	-61.97102	115.9447
batesvi~igdd	(dropped)					
_cons	1355.375	2012.384	0.67	0.510	-2910.688	5621.439

Yazoo City, MS

Linear regression

Number of obs	= 22
F(9, 12)	= 1.02
Prob > F	= 0.4771
R-squared	= 0.5186
Root MSE	= 9.1498

yazoocitym~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
yazoocitym~i	-3813.209	6057.574	-0.63	0.541	-17011.53	9385.112
yazoo_cp	-35.09098	62.44078	-0.56	0.584	-171.1378	100.9558
yazoo_gdd	-8.446845	16.34374	-0.52	0.615	-44.05679	27.1631
yazoo_ndvi2	1972.449	3666.062	0.54	0.600	-6015.214	9960.112
yazoo_cp2	.0807863	.3074945	0.26	0.797	-.5891866	.7507593
yazoo_gdd2	.0037624	.0139535	0.27	0.792	-.0266397	.0341644
yazoo_cpgdd	-.0336206	.2623916	-0.13	0.900	-.6053228	.5380817
yazoo_ndvicp	39.8859	75.8576	0.53	0.609	-125.3936	205.1654
yazoo_ndvi~d	11.13524	20.45858	0.54	0.596	-33.44018	55.71066
_cons	1854.543	2571.649	0.72	0.485	-3748.6	7457.686

Angelica, NY

Linear regression

Number of obs	= 12
F(0, 2)	= .
Prob > F	= .
R-squared	= 0.9510
Root MSE	= 4.9279

angelicany~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
angelicany~i	32716.55	.	.	.	.	.
angelica_cp	-138.0211	.	.	.	.	.
angelica_gdd	-203.2377	.	.	.	.	.
angelica_n~2	-20911.43	.	.	.	.	.
angelica_cp2	-.5797227	.	.	.	.	.
angelica_g~2	-.0667262	.	.	.	.	.
angelica_c~d	.1524282	.	.	.	.	.
angelica_n~p	178.4685	.	.	.	.	.
angelica_n~d	239.6487	.	.	.	.	.
_cons	-12713.71	.	.	.	.	.

Riverhead, NY

Linear regression

Number of obs	= 20
F(9, 10)	= 1.50
Prob > F	= 0.2685
R-squared	= 0.4483
Root MSE	= 6.6475

riverheadn~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
riverheadn~i	-99.46671	1146.257	-0.09	0.933	-2653.486	2454.552
riverhead_cp	1.939268	15.64271	0.12	0.904	-32.91487	36.79341
riverhe~_gdd	-.117822	.6746737	-0.17	0.865	-1.621089	1.385445
riverhead~i2	317.1097	1013.354	0.31	0.761	-1940.785	2575.004
riverhead~p2	-.0191752	.1313136	-0.15	0.887	-.3117601	.2734098
riverhead~d2	.0006334	.0010753	0.59	0.569	-.0017626	.0030293
riverhe~pgdd	.0039961	.046261	0.09	0.933	-.0990798	.1070721
riverhea~icp	-7.444091	38.43954	-0.19	0.850	-93.09273	78.20455
riverhe~igdd	-.3657982	1.722204	-0.21	0.836	-4.203109	3.471512
_cons	65.60401	262.8119	0.25	0.808	-519.9775	651.1855

Fredonia, NY

Linear regression

Number of obs	= 9
F(8, 0)	= .
Prob > F	= .
R-squared	= 1.0000
Root MSE	= 0

fredoniany~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
fredoniany~i	(dropped)					
fredonia_cp	86.47184	7.59977	11.38	.	.	.
fredonia_gdd	10.39545	.9644384	10.78	.	.	.
fredonia_n~2	570.9995	64.90501	8.80	.	.	.
fredonia_cp2	-1.841552	.1497037	-12.30	.	.	.
fredonia_g~2	-.0192242	.0017692	-10.87	.	.	.
fredonia_c~d	-.3950932	.035417	-11.16	.	.	.
fredonia_n~p	-26.38387	3.148439	-8.38	.	.	.
fredonia_n~d	-4.521798	.4983747	-9.07	.	.	.
_cons	-850.2493	78.63009	-10.81	.	.	.

Du Quoin, IL

Linear regression

Number of obs	= 22
F(9, 12)	= 0.16
Prob > F	= 0.9954
R-squared	= 0.3022
Root MSE	= 8.986

duquoinil_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
duquoinil_~i	-522.0029	1479.224	-0.35	0.730	-3744.956	2700.95
duquoin_cp	4.536545	23.73432	0.19	0.852	-47.17609	56.24918
duquoin_gdd	.4496125	6.431619	0.07	0.945	-13.56368	14.46291
duquoin_nd~2	409.5261	802.9698	0.51	0.619	-1339.995	2159.047
duquoin_cp2	-.0224119	.1849499	-0.12	0.906	-.4253831	.3805593
duquoin_gdd2	-.0053295	.0166891	-0.32	0.755	-.0416919	.0310328
duquoin_cp~d	-.0099594	.0564957	-0.18	0.863	-.1330529	.1131341
duquoin_nd~p	-4.919432	25.18025	-0.20	0.848	-59.78249	49.94363
duquoin_nd~d	-.0703154	7.511318	-0.01	0.993	-16.43607	16.29544
_cons	193.6238	699.4225	0.28	0.787	-1330.287	1717.535

Minonk, IL

Linear regression

Number of obs	= 22
F(9, 12)	= 0.30
Prob > F	= 0.9606
R-squared	= 0.3338
Root MSE	= 13.369

minonkil_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
minonkil_m~i	974.0359	4064.652	0.24	0.815	-7882.079	9830.151
minonk_cp	15.34935	49.56083	0.31	0.762	-92.63442	123.3331
minonk_gdd	47.55891	376364	0.00	1.000	-819979.2	820074.3
minonk_ndvi2	-525.0528	2767.307	-0.19	0.853	-6554.498	5504.392
minonk_cp2	-.0451123	.2102437	-0.21	0.834	-.5031938	.4129693
minonk_gdd2	-1.72273	7773.977	-0.00	1.000	-16939.76	16936.32
minonk_cpgdd	1.713455	3563.036	0.00	1.000	-7761.475	7764.902
minonk_ndv~p	-17.00657	58.07126	-0.29	0.775	-143.533	109.5198
minonk_ndv~d	-71.97292	455865.8	-0.00	1.000	-993318.3	993174.3
_cons	-392.7288	1459.766	-0.27	0.792	-3573.285	2787.828

Ardmore, SD

Linear regression

Number of obs	22
F(9, 12)	1.36
Prob > F	0.3036
R-squared	0.4486
Root MSE	5.8739

ardmoresd_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
ardmoresd_~i	219.2954	587.5873	0.37	0.715	-1060.947	1499.538
ardmore_cp	3.163519	15.55935	0.20	0.842	-30.7374	37.06444
ardmore_gdd	-.1853926	1.525915	-0.12	0.905	-3.510075	3.13929
ardmore_nd~2	-105.6863	362.2723	-0.29	0.775	-895.0099	683.6372
ardmore_cp2	-.0467921	.2367557	-0.20	0.847	-.5626385	.4690542
ardmore_gdd2	.0008695	.0032745	0.27	0.795	-.006265	.008004
ardmore_cp~d	.0263807	.047877	0.55	0.592	-.0779344	.1306958
ardmore_nd~p	-5.012887	16.92836	-0.30	0.772	-41.89662	31.87085
ardmore_nd~d	-.2582181	1.548699	-0.17	0.870	-3.632543	3.116107
_cons	-55.57694	270.6126	-0.21	0.841	-645.1912	534.0373

Windsor, IL

Linear regression

Number of obs	22
F(9, 12)	1.78
Prob > F	0.1728
R-squared	0.3938
Root MSE	8.7935

windsoril_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
windsoril_~i	489.3214	1518.145	0.32	0.753	-2818.433	3797.076
windsor_cp	-9.07136	28.87484	-0.31	0.759	-71.98423	53.84151
windsor_gdd	-.3964352	.4818188	-0.82	0.427	-1.446228	.6533578
windsor_nd~2	-342.4699	904.7362	-0.38	0.712	-2313.721	1628.781
windsor_cp2	.3208783	.2948763	1.09	0.298	-.3216019	.9633586
windsor_gdd2	-.0000229	.000221	-0.10	0.919	-.0005044	.0004585
windsor_cp~d	-.0089765	.0104051	-0.86	0.405	-.0316473	.0136943
windsor_nd~p	2.135824	28.39294	0.08	0.941	-59.72707	63.99872
windsor_nd~d	.6236645	.488207	1.28	0.226	-.4400472	1.687376
_cons	-77.10993	722.1689	-0.11	0.917	-1650.581	1496.361

White Hall, IL

Linear regression

Number of obs	22
F(7, 13)	.
Prob > F	.
R-squared	0.3811
Root MSE	9.015

whitehalli~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
whitehalli~i	1434.19	2443.882	0.59	0.567	-3845.497	6713.877
whitehall_cp	-10.90035	19.24111	-0.57	0.581	-52.46825	30.66755
whiteha~_gdd	-20.14654	26.92923	-0.75	0.468	-78.32361	38.03053
whitehall~i2	-1010.714	1677.731	-0.60	0.557	-4635.232	2613.804
whitehall~p2	.0812905	.1187563	0.68	0.506	-.1752669	.3378479
whitehall~d2	.0134283	.0179721	0.75	0.468	-.025398	.0522547
whiteha~pgdd	1.172964	1.568398	0.75	0.468	-2.215354	4.561283
whitehal~icp	9.718563	23.16347	0.42	0.682	-40.32307	59.76019
whiteha~igdd	(dropped)					
_cons	-419.0673	883.2496	-0.47	0.643	-2327.212	1489.078

Beaverdam, KY

Linear regression

Number of obs	= 22
F(9, 12)	= 1.62
Prob > F	= 0.2135
R-squared	= 0.5779
Root MSE	= 8.8474

beaverdamk~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
beaverdamk~i	-210.5991	6357.255	-0.03	0.974	-14061.87	13640.67
beaverdam_cp	36.83333	50.50132	0.73	0.480	-73.19958	146.8663
beaverd~_gdd	-.3199919	2.41394	-0.13	0.897	-5.579516	4.939532
beaverdam~i2	577.565	4557.035	0.13	0.901	-9351.362	10506.49
beaverdam~p2	-.037454	.3603674	-0.10	0.919	-.8226272	.7477191
beaverdam~d2	.000176	.0006753	0.26	0.799	-.0012952	.0016473
beaverd~pgdd	-.0022333	.033208	-0.07	0.947	-.0745873	.0701208
beaverda~icp	-47.72983	54.94607	-0.87	0.402	-167.447	71.98738
beaverd~igdd	.2527671	2.280562	0.11	0.914	-4.71615	5.221684
_cons	-95.60423	2236.445	-0.04	0.967	-4968.4	4777.191

Providence, KY

Linear regression

Number of obs	= 22
F(9, 12)	= 0.82
Prob > F	= 0.6132
R-squared	= 0.5393
Root MSE	= 10.495

providence~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
providence~i	-1061.833	9404.04	-0.11	0.912	-21551.48	19427.81
providence~p	52.10165	92.13647	0.57	0.582	-148.6465	252.8498
providn~_gdd	-.7556605	1.032285	-0.73	0.478	-3.004816	1.493495
providnec~i2	1190.071	5704.588	0.21	0.838	-11239.16	13619.3
providnec~p2	.1719209	.6456064	0.27	0.795	-1.234735	1.578576
providnec~d2	.0001144	.0001103	1.04	0.320	-.0001259	.0003548
providn~pgdd	-.0004132	.0075578	-0.05	0.957	-.0168801	.0160538
providnece~p	-75.17089	126.6589	-0.59	0.564	-351.1369	200.7952
providn~igdd	.8964586	1.353336	0.66	0.520	-2.052208	3.845125
_cons	213.1955	3959.4	0.05	0.958	-8413.596	8839.987

Farmville, VA

Linear regression

Number of obs	= 20
F(9, 10)	= 1.06
Prob > F	= 0.4585
R-squared	= 0.5876
Root MSE	= 9.7164

farmvillev~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
farmvillev~i	3794.078	6525.373	0.58	0.574	-10745.36	18333.51
farmville_cp	-104.5763	65.11351	-1.61	0.139	-249.6582	40.50564
farmvil~_gdd	-1.432604	1.957256	-0.73	0.481	-5.793641	2.928434
farmville~i2	-3496.564	4492.829	-0.78	0.454	-13507.21	6514.083
farmville~p2	.1088195	.2101744	0.52	0.616	-.3594783	.5771174
farmville~d2	-.0002216	.0012323	-0.18	0.861	-.0029673	.0025242
farmvil~pgdd	-.0161437	.0340928	-0.47	0.646	-.0921071	.0598198
farmvill~icp	127.93	79.83243	1.60	0.140	-49.94769	305.8078
farmvil~igdd	2.05335	2.051961	1.00	0.341	-2.518703	6.625404
_cons	-739.8238	2443.782	-0.30	0.768	-6184.91	4705.263

Heppner, OR

Linear regression

Number of obs	= 22
F(9, 12)	= 8.77
Prob > F	= 0.0005
R-squared	= 0.5673
Root MSE	= 11.331

heppneror_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
heppneror_~i	1175.42	1330.759	0.88	0.394	-1724.055	4074.894
heppner_cp	18.71314	39.68772	0.47	0.646	-67.75897	105.1852
heppner_gdd	-3.462206	2.789068	-1.24	0.238	-9.539062	2.614651
heppner_nd~2	-1349.327	1820.77	-0.74	0.473	-5316.444	2617.79
heppner_cp2	-1.926163	1.97864	-0.97	0.350	-6.237249	2.384924
heppner_gdd2	.0466862	.0240823	1.94	0.076	-.0057847	.099157
heppner_cp~d	.1729583	.2009066	0.86	0.406	-.2647795	.6106961
heppner_nd~p	-5.296972	94.78628	-0.06	0.956	-211.8185	201.2246
heppner_nd~d	3.139582	6.438356	0.49	0.635	-10.88839	17.16755
_cons	-229.9842	252.8717	-0.91	0.381	-780.9444	320.976

Eltopia, WA

Linear regression

Number of obs	= 22
F(9, 12)	= 0.40
Prob > F	= 0.9141
R-squared	= 0.1886
Root MSE	= 9.4417

eltopiawa_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
eltopiawa_~i	1344.134	3414.137	0.39	0.701	-6094.631	8782.899
eltopia_cp	-150.3141	289.7823	-0.52	0.613	-781.6956	481.0674
eltopia_gdd	1.359736	1.482075	0.92	0.377	-1.869428	4.588901
eltopia_nd~2	-1115.703	2749.532	-0.41	0.692	-7106.419	4875.012
eltopia_cp2	-9.439926	13.51372	-0.70	0.498	-38.8838	20.00395
eltopia_gdd2	.0005112	.0020714	0.25	0.809	-.0040021	.0050245
eltopia_cp~d	.0731391	.2220345	0.33	0.748	-.4106326	.5569108
eltopia_nd~p	255.2606	454.7717	0.56	0.585	-735.6018	1246.123
eltopia_nd~d	-2.230116	2.539788	-0.88	0.397	-7.763838	3.303606
_cons	-356.6675	1083.387	-0.33	0.748	-2717.165	2003.83

Menomonie, WI

Linear regression

Number of obs	= 18
F(9, 8)	= 1.17
Prob > F	= 0.4157
R-squared	= 0.7344
Root MSE	= 5.3801

menomoniew~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
menomoniew~i	11344.66	9391.079	1.21	0.262	-10311.21	33000.52
menomonie_cp	-39.93709	54.52757	-0.73	0.485	-165.6779	85.80371
menomon~_gdd	-1.144775	1.621529	-0.71	0.500	-4.884027	2.594477
menomonie~i2	-7620.355	5916.175	-1.29	0.234	-21263.08	6022.369
menomonie~p2	.4407006	.3541906	1.24	0.249	-.3760643	1.257466
menomonie~d2	.0005281	.0003165	1.67	0.134	-.0002016	.0012579
menomon~pgdd	.0395373	.0211339	1.87	0.098	-.0091976	.0882722
menomoni~icp	29.12969	58.79096	0.50	0.634	-106.4425	164.7019
menomon~igdd	.5881746	1.997048	0.29	0.776	-4.017025	5.193374
_cons	-4011.876	3735.6	-1.07	0.314	-12626.19	4602.434

Arlington, WI

Linear regression

Number of obs =	22
F(9, 12) =	0.72
Prob > F =	0.6874
R-squared =	0.5418
Root MSE =	9.9203

arlingtonw~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
arlingtonw~i	6093.416	3393.856	1.80	0.098	-1301.16	13487.99
arlington_cp	-5.121173	69.05195	-0.07	0.942	-155.5724	145.3301
arlingt~_gdd	.4694262	2.304255	0.20	0.842	-4.551115	5.489967
arlington~i2	-4027.817	2304.19	-1.75	0.106	-9048.215	992.5821
arlington~p2	-.2857965	.5275149	-0.54	0.598	-1.435153	.8635598
arlington~d2	.0006148	.0012177	0.50	0.623	-.0020385	.003268
arlingt~pgdd	.0213703	.0568383	0.38	0.713	-.1024697	.1452104
arlingto~icp	16.41859	69.63959	0.24	0.818	-135.313	168.1502
arlingt~igdd	-1.251544	2.203906	-0.57	0.581	-6.053442	3.550353
_cons	-2278.425	1403.472	-1.62	0.130	-5336.328	779.4778

Sellingsgrove, PA

Linear regression

Number of obs =	22
F(5, 16) =	1.51
Prob > F =	0.2407
R-squared =	0.2868
Root MSE =	5.6887

sellingsgr~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
selingsgro~i	-856.9242	2659.073	-0.32	0.751	-6493.907	4780.059
selingsgro~p	-12.96831	21.48268	-0.60	0.555	-58.50955	32.57294
selling~_gdd	(dropped)					
sellingsg~i2	377.883	1931.777	0.20	0.847	-3717.301	4473.067
sellingsg~p2	.0164978	.1833412	0.09	0.929	-.3721682	.4051638
sellingsg~d2	(dropped)					
selling~pgdd	(dropped)					
sellingsgr~p	15.35944	26.57497	0.58	0.571	-40.97697	71.69586
selling~igdd	(dropped)					
_cons	486.0191	914.7494	0.53	0.603	-1453.163	2425.201

Regression Results for Hay Yields

Algona, IA

Linear regression

Number of obs =	22
F(9, 12) =	1.89
Prob > F =	0.1504
R-squared =	0.7371
Root MSE =	.41579

algonaia_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
algonaia_m~i	262.3999	669.7544	0.39	0.702	-1196.87	1721.669
algona_cp	.5999193	4.172153	0.14	0.888	-8.490422	9.69026
algona_gdd	-.1122503	.3040673	-0.37	0.718	-.774756	.5502553
alongona_m~2	-158.3539	416.588	-0.38	0.710	-1066.021	749.3133
algona_cp2	-.0106205	.0131742	-0.81	0.436	-.0393247	.0180837
algona_gdd2	.0000495	.0000792	0.63	0.544	-.000123	.000222
algona_cpgdd	-5.98e-06	.0018088	-0.00	0.997	-.003947	.003935
algona_ndv~p	-.1827512	4.95729	-0.04	0.971	-10.98376	10.61826
algona_ndv~d	.1253855	.3469944	0.36	0.724	-.6306503	.8814213
_cons	-109.2842	271.876	-0.40	0.695	-701.6512	483.0827

Rockrapids, IA

Linear regression

Number of obs =	22
F(5, 16) =	1.08
Prob > F =	0.4086
R-squared =	0.3108
Root MSE =	.56302

rockrapids~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
rockrapids~i	601.8646	440.198	1.37	0.190	-331.3135	1535.043
rockrapi~_cp	1.367937	1.519516	0.90	0.381	-1.853294	4.589168
rockrap~_gdd	(dropped)					
rockrapid~i2	-333.9187	251.1709	-1.33	0.202	-866.3772	198.5398
rockrapid~p2	.0062002	.01451	0.43	0.675	-.0245596	.03696
rockrapid~d2	(dropped)					
rockrap~pgdd	(dropped)					
rockrapi~icp	-1.771068	1.633952	-1.08	0.294	-5.234892	1.692755
rockrap~igdd	(dropped)					
_cons	-265.6537	191.6626	-1.39	0.185	-671.9602	140.6528

Saluda, SC

Linear regression

Number of obs =	22
F(8, 13) =	849.27
Prob > F =	0.0000
R-squared =	0.5821
Root MSE =	.39648

saluda_yie~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
saludasc_m~i	-341.6133	762.1852	-0.45	0.661	-1988.214	1304.988
saluda_cp	-.7317439	2.504153	-0.29	0.775	-6.141637	4.678149
saluda_gdd	.2621284	.4768213	0.55	0.592	-.7679814	1.292238
saluda_ndvi2	214.2217	474.6045	0.45	0.659	-811.099	1239.542
saluda_cp2	.0014702	.0110402	0.13	0.896	-.0223807	.0253212
saluda_gdd2	.0133031	.0130254	1.02	0.326	-.0148366	.0414428
saluda_cpgdd	-.0312691	.0389084	-0.80	0.436	-.1153256	.0527874
saluda_ndv~p	.9233399	3.168726	0.29	0.775	-5.922277	7.768957
saluda_ndv~d	(dropped)					
_cons	138.2707	305.0668	0.45	0.658	-520.7861	797.3275

Angelica, NY

Linear regression

Number of obs =	21
F(8, 12) =	9.12
Prob > F =	0.0005
R-squared =	0.2632
Root MSE =	.19965

angelicany~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
angelicany~i	-20.27773	107.8681	-0.19	0.854	-255.3022	214.7468
angelica_cp	.2140865	.74112	0.29	0.778	-1.400675	1.828848
angelica_gdd	.0602444	.0889176	0.68	0.511	-.1334905	.2539792
angelica_n~2	13.11143	66.05102	0.20	0.846	-130.8014	157.0242
angelica_cp2	-.0041946	.0074905	-0.56	0.586	-.0205151	.0121258
angelica_g~2	-.0013496	.0012396	-1.09	0.298	-.0040504	.0013512
angelica_c~d	-.000628	.0058612	-0.11	0.916	-.0133984	.0121424
angelica_n~p	-.1043994	1.007592	-0.10	0.919	-2.299753	2.090954
angelica_n~d	(dropped)					
_cons	8.90666	44.86055	0.20	0.846	-88.83607	106.6494

Riverhead, NY

Linear regression

Number of obs =	21
F(9, 11) =	0.70
Prob > F =	0.6975
R-squared =	0.2308
Root MSE =	.53072

riverheadn~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
riverheadn~i	-64.86146	54.99914	-1.18	0.263	-185.9138	56.19084
riverhead_cp	-.6891965	.551371	-1.25	0.237	-1.902756	.524363
riverhe~_gdd	-.020673	.0475026	-0.44	0.672	-.1252255	.0838795
riverhead~i2	43.55851	58.28963	0.75	0.471	-84.73611	171.8531
riverhead~p2	.0030419	.0058801	0.52	0.615	-.0099001	.0159839
riverhead~d2	-1.84e-07	.0000741	-0.00	0.998	-.0001634	.000163
riverhe~pgdd	.000542	.0021827	0.25	0.808	-.0042621	.0053461
riverhea~icp	1.759066	1.187307	1.48	0.167	-.85418	4.372311
riverhe~igdd	.048378	.0695806	0.70	0.501	-.1047678	.2015238
_cons	19.01838	13.81681	1.38	0.196	-11.39221	49.42898

Fredonia, NY

Linear regression

Number of obs	= 21
F(9, 11)	= 0.38
Prob > F	= 0.9226
R-squared	= 0.3827
Root MSE	= .22018

fredoniany~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
fredoniany~i	-.5535508	9.360303	-0.06	0.954	-21.15544	20.04834
fredonia_cp	.0178996	.2949693	0.06	0.953	-.6313234	.6671226
fredonia_gdd	.0103718	.0261205	0.40	0.699	-.0471192	.0678627
fredonia_n~2	2.412512	6.037043	0.40	0.697	-10.87493	15.69995
fredonia_cp2	.0008606	.0092877	0.09	0.928	-.0195814	.0213027
fredonia_g~2	-.0000333	.0000627	-0.53	0.607	-.0001713	.0001048
fredonia_c~d	.0000355	.001338	0.03	0.979	-.0029094	.0029803
fredonia_n~p	-.0540006	.3631268	-0.15	0.884	-.8532374	.7452361
fredonia_n~d	-.0108836	.0196451	-0.55	0.591	-.0541222	.0323551
_cons	1.702421	4.143479	0.41	0.689	-7.417315	10.82216

Du Quoin, IL

Linear regression

Number of obs	= 22
F(9, 12)	= 1.03
Prob > F	= 0.4694
R-squared	= 0.4752
Root MSE	= .3372

duquoinil_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
duquoinil_~i	-18.67534	52.93353	-0.35	0.730	-134.0076	96.65691
duquoin_cp	-.5137276	.6642261	-0.77	0.454	-1.960952	.9334968
duquoin_gdd	-.0151936	.1695005	-0.09	0.930	-.3845034	.3541161
duquoin_nd~2	6.589409	30.22375	0.22	0.831	-59.26248	72.4413
duquoin_cp2	.0007281	.0038709	0.19	0.854	-.0077058	.0091621
duquoin_gdd2	-.0001593	.0003687	-0.43	0.673	-.0009626	.000644
duquoin_cp~d	.0003412	.0014412	0.24	0.817	-.0027988	.0034812
duquoin_nd~p	.7010807	.7776018	0.90	0.385	-.9931681	2.39533
duquoin_nd~d	.0204497	.2108346	0.10	0.924	-.4389193	.4798188
_cons	12.54916	23.60058	0.53	0.605	-38.87208	63.9704

Minonk, IL

Linear regression

Number of obs	= 17
F(8, 8)	= 0.66
Prob > F	= 0.7180
R-squared	= 0.4792
Root MSE	= .79376

minonkil_y~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
minonkil_m~i	243.1912	288.6595	0.84	0.424	-422.4587	908.8411
minonk_cp	-1.926516	4.576832	-0.42	0.685	-12.48071	8.627678
minonk_gdd	.3390017	.7044986	0.48	0.643	-1.285575	1.963578
minonk_ndvi2	-167.5637	197.1238	-0.85	0.420	-622.1321	287.0047
minonk_cp2	-.0201686	.0171822	-1.17	0.274	-.0597909	.0194537
minonk_gdd2	-.0447596	.4187465	-0.11	0.918	-1.010391	.9208716
minonk_cpgdd	-.0212073	.1116171	-0.19	0.854	-.2785967	.2361821
minonk_ndv~p	2.988087	5.195593	0.58	0.581	-8.992972	14.96915
minonk_ndv~d	(dropped)					
_cons	-86.27609	105.6009	-0.82	0.438	-329.7922	157.24

Windsor, IL

Linear regression

Number of obs =	22
F(9, 12) =	0.94
Prob > F =	0.5240
R-squared =	0.4874
Root MSE =	.52194

windsoril_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
windsoril_~i	-64.93517	98.31755	-0.66	0.521	-279.1507	149.2804
windsor_cp	1.286248	1.222473	1.05	0.313	-1.377293	3.949789
windsor_gdd	-.0036794	.043512	-0.08	0.934	-.098484	.0911252
windsor_nd~2	47.94735	62.01857	0.77	0.454	-87.1795	183.0742
windsor_cp2	-.0091679	.0153632	-0.60	0.562	-.0426414	.0243057
windsor_gdd2	-2.32e-06	.0000247	-0.09	0.927	-.0000561	.0000515
windsor_cp~d	-.0001545	.0007784	-0.20	0.846	-.0018504	.0015414
windsor_nd~p	-1.193685	1.039095	-1.15	0.273	-3.457678	1.070308
windsor_nd~d	.0093468	.0460433	0.20	0.843	-.090973	.1096665
_cons	21.30999	35.10377	0.61	0.555	-55.17455	97.79454

White Hall, IL

Linear regression

Number of obs =	22
F(7, 13) =	.
Prob > F =	.
R-squared =	0.7430
Root MSE =	.25657

whitehalli~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
whitehalli~i	31.27656	51.24848	0.61	0.552	-79.43906	141.9922
whitehall_cp	-.8226845	.3460713	-2.38	0.033	-1.570326	-.075043
whiteha~_gdd	-1.101324	1.168371	-0.94	0.363	-3.625437	1.422788
whitehall~i2	-31.77828	34.13604	-0.93	0.369	-105.5247	41.96816
whitehall~p2	-.0090593	.0048293	-1.88	0.083	-.0194924	.0013738
whitehall~d2	.000732	.0007796	0.94	0.365	-.0009523	.0024163
whiteha~pgdd	.0641959	.0680612	0.94	0.363	-.0828415	.2112332
whitehal~icp	1.352033	.4481148	3.02	0.010	.3839395	2.320126
whiteha~igdd	(dropped)					
_cons	-3.389193	19.20618	-0.18	0.863	-44.88162	38.10324

Beaverdam, KY

Linear regression

Number of obs =	22
F(9, 12) =	1.38
Prob > F =	0.2967
R-squared =	0.6385
Root MSE =	.31252

beaverdamk~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
beaverdamk~i	-32.04028	426.1315	-0.08	0.941	-960.501	896.4205
beaverdam_cp	-.2918078	3.475541	-0.08	0.934	-7.864361	7.280745
beaverd~_gdd	-.0019621	.0945299	-0.02	0.984	-.2079251	.2040008
beaverdam~i2	16.8392	269.6761	0.06	0.951	-570.7346	604.413
beaverdam~p2	.0016308	.0224166	0.07	0.943	-.0472108	.0504723
beaverdam~d2	-9.06e-06	.0000239	-0.38	0.712	-.0000612	.0000431
beaverd~pgdd	-.0000769	.0014751	-0.05	0.959	-.0032909	.0031372
beaverda~icp	.4245456	4.024037	0.11	0.918	-8.343078	9.192169
beaverd~igdd	.0098705	.1035827	0.10	0.926	-.2158167	.2355578
_cons	15.65402	172.0746	0.09	0.929	-359.2644	390.5724

Providence, KY

Linear regression

Number of obs	=	22
F(9, 12)	=	1.74
Prob > F	=	0.1840
R-squared	=	0.6093
Root MSE	=	.23107

providence~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
providence~i	102.5668	204.1666	0.50	0.625	-342.2741	547.4077
providence~p	1.071016	1.756766	0.61	0.553	-2.756649	4.898682
providn~_gdd	.0138128	.0257694	0.54	0.602	-.0423339	.0699594
providnec~i2	-50.24293	130.4747	-0.39	0.707	-334.5229	234.037
providnec~p2	.0016522	.0096592	0.17	0.867	-.0193935	.0226979
providnec~d2	-8.43e-07	1.79e-06	-0.47	0.646	-4.74e-06	3.06e-06
providn~pgdd	-.0000988	.0001552	-0.64	0.536	-.000437	.0002394
providnece~p	-1.359444	2.455217	-0.55	0.590	-6.708903	3.990015
providn~igdd	-.0158313	.0336536	-0.47	0.646	-.0891562	.0574936
_cons	-47.58284	82.48739	-0.58	0.575	-227.3074	132.1417

Farmville, VA

Linear regression

Number of obs	=	10
F(5, 4)	=	2.68
Prob > F	=	0.1802
R-squared	=	0.7594
Root MSE	=	.25828

farmvillev~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
farmvillev~i	-378.277	283.1911	-1.34	0.253	-1164.541	407.9876
farmville_cp	1.99739	3.562707	0.56	0.605	-7.89427	11.88905
farmvil~_gdd	(dropped)					
farmville~i2	260.4004	178.1108	1.46	0.218	-234.1144	754.9152
farmville~p2	-.0042363	.0213135	-0.20	0.852	-.0634121	.0549395
farmville~d2	(dropped)					
farmvil~pgdd	(dropped)					
farmvill~icp	-2.325044	3.867337	-0.60	0.580	-13.06249	8.412406
farmvil~igdd	(dropped)					
_cons	136.8175	118.9477	1.15	0.314	-193.4343	467.0693

Heppner, OR

Linear regression

Number of obs	=	21
F(9, 11)	=	0.15
Prob > F	=	0.9954
R-squared	=	0.3950
Root MSE	=	.58663

heppneror_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
heppneror_~i	-14.27929	142.7063	-0.10	0.922	-328.3737	299.8152
heppner_cp	-.5829756	5.165	-0.11	0.912	-11.95106	10.78511
heppner_gdd	.2390269	.7233623	0.33	0.747	-1.353083	1.831137
heppner_nd~2	10.8174	168.7623	0.06	0.950	-360.6259	382.2607
heppner_cp2	-.023095	.2858307	-0.08	0.937	-.6522042	.6060142
heppner_gdd2	-.0016311	.0044104	-0.37	0.719	-.0113382	.0080761
heppner_cp~d	-.0191319	.0302127	-0.63	0.540	-.0856296	.0473657
heppner_nd~p	1.948754	11.64613	0.17	0.870	-23.6842	27.58171
heppner_nd~d	-.309111	1.565155	-0.20	0.847	-3.753993	3.135771
_cons	8.5916	32.67451	0.26	0.797	-63.3245	80.5077

Eltopia, WA

Linear regression

Number of obs =	18
F(9, 8) =	0.84
Prob > F =	0.6033
R-squared =	0.6681
Root MSE =	.44806

eltopiawa_~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
eltopiawa_~i	224.218	1294.395	0.17	0.867	-2760.663	3209.099
eltopia_cp	-15.08018	71.57016	-0.21	0.838	-180.1213	149.9609
eltopia_gdd	-.0714219	.4857287	-0.15	0.887	-1.191514	1.048671
eltopia_nd~2	-189.1907	1059.312	-0.18	0.863	-2631.968	2253.587
eltopia_cp2	-.6127022	2.726427	-0.22	0.828	-6.899854	5.67445
eltopia_gdd2	-.0000152	.0001784	-0.09	0.934	-.0004267	.0003962
eltopia_cp~d	-.0129429	.0312281	-0.41	0.689	-.0849551	.0590693
eltopia_nd~p	25.72379	114.8015	0.22	0.828	-239.009	290.4566
eltopia_nd~d	.1435507	.7778935	0.18	0.858	-1.650275	1.937376
_cons	-61.23941	396.3157	-0.15	0.881	-975.1451	852.6663

Menomonie, WI

Linear regression

Number of obs =	22
F(9, 12) =	2.10
Prob > F =	0.1150
R-squared =	0.7404
Root MSE =	.30863

menomoniew~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
menomoniew~i	45.39174	255.3676	0.18	0.862	-511.0064	601.7899
menomonie_cp	.0264661	1.469814	0.02	0.986	-3.175982	3.228915
menomon~_gdd	.0114868	.0551275	0.21	0.838	-.1086257	.1315993
menomonie~i2	-27.6094	167.4372	-0.16	0.872	-392.4237	337.2049
menomonie~p2	.0079874	.0129248	0.62	0.548	-.0201733	.0361481
menomonie~d2	-.0000298	.000018	-1.65	0.124	-.0000689	9.43e-06
menomon~pgdd	-.0004755	.0009211	-0.52	0.615	-.0024823	.0015314
menomoni~icp	-.3433426	1.670982	-0.21	0.841	-3.9841	3.297415
menomon~igdd	.0060539	.0579562	0.10	0.919	-.1202218	.1323295
_cons	-14.73697	95.96027	-0.15	0.880	-223.8164	194.3425

Arlington, WI

Linear regression

Number of obs =	22
F(9, 12) =	2.30
Prob > F =	0.0895
R-squared =	0.7436
Root MSE =	.40626

arlingtonw~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
arlingtonw~i	529.1263	152.3035	3.47	0.005	197.2855	860.9671
arlington_cp	.3725985	3.127428	0.12	0.907	-6.441481	7.186678
arlingt~_gdd	.0838306	.1369417	0.61	0.552	-.2145398	.3822009
arlington~i2	-336.2931	92.6652	-3.63	0.003	-538.1933	-134.393
arlington~p2	-.0134963	.0229302	-0.59	0.567	-.0634568	.0364642
arlington~d2	-3.47e-06	.000067	-0.05	0.960	-.0001494	.0001424
arlingt~pgdd	.0005176	.0029161	0.18	0.862	-.0058361	.0068713
arlingto~icp	.0699152	3.075955	0.02	0.982	-6.632016	6.771846
arlingt~igdd	-.1147619	.1205757	-0.95	0.360	-.3774739	.1479501
_cons	-207.7053	72.51311	-2.86	0.014	-365.6978	-49.71279

Sellingsgrove, PA

Linear regression

Number of obs	=	22
F(5, 16)	=	0.77
Prob > F	=	0.5824
R-squared	=	0.1930
Root MSE	=	.25724

sellingsgr~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
selingsgro~i	42.9509	101.2968	0.42	0.677	-171.7888	257.6906
selingsgro~p	.70271	.6041612	1.16	0.262	-.5780545	1.983474
selling~_gdd	(dropped)					
sellingsg~i2	-22.14866	63.81773	-0.35	0.733	-157.4362	113.1389
sellingsg~p2	-.0068448	.0063368	-1.08	0.296	-.0202783	.0065886
sellingsg~d2	(dropped)					
selling~pgdd	(dropped)					
sellingsgr~p	-.6320792	.6374368	-0.99	0.336	-1.983385	.7192264
selling~igdd	(dropped)					
_cons	-18.91773	40.35939	-0.47	0.646	-104.4758	66.64037

Montrose, PA

Linear regression

Number of obs	=	22
F(6, 15)	=	31.57
Prob > F	=	0.0000
R-squared	=	0.5187
Root MSE	=	.22945

montrosepa~s	Coef.	Robust HC3 Std. Err.	t	P>|t|	[95% Conf.	Interval]
montrosepa~i	-89.51918	84.60658	-1.06	0.307	-269.8538	90.81547
montrose_cp	-.1800463	.4105007	-0.44	0.667	-1.055008	.6949153
montrose_gdd	(dropped)					
montrose_n~2	48.46891	46.07637	1.05	0.309	-49.74055	146.6784
montrose_cp2	-.0038612	.004662	-0.83	0.421	-.0137979	.0060755
montrose_g~2	(dropped)					
montrose_c~d	-.0052577	.0025402	-2.07	0.056	-.0106721	.0001567
montrose_n~p	.3784558	.3971483	0.95	0.356	-.4680459	1.224957
montrose_n~d	(dropped)					
_cons	41.83163	38.84416	1.08	0.299	-40.96275	124.626

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